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THE ORAL ASPECTS OF DIABETES MELLITUS

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DIABETES MELLITUS is a systemic, lifelong disease which, if not well controlled, is accompanied by or results in numerous complications. The mouth of the diabetic frequently presents pathologic changes the relation of which to the diabetes is still not definitely established and deserves further study.

Two years ago a dental surgeon was assigned to the Diabetic Clinic of the Beth Israel Hospital for the study and treatment of oral manifestations in diabetes. There follows a report of the findings in 403 patients with diabetes who have since then been examined and studied. The oral cavitv as affected by diabetes mellitus is of interest to both the dentist and physician. Of the patients studied, 138 were advanced in years, presenting edentulous mouths, and as a result no dental treatment was necessary. The remaining 265, who retained some or all of their teeth, were followed clinically and wherever possible radiographically.

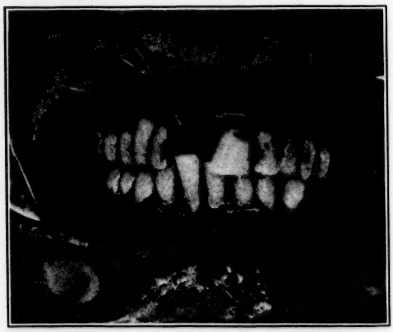

Figure 1. *Photograph of the mouth of a careless and thus uncontrolled diabetic, twenty-one-year-old young man, showing generalized atrophy of the papillae and pathologic wandering of the teeth due to diffuse alveolar atrophy.*

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Among the latter were 4 children and 3 young adults who had diabetes of long standing. Of this group, 6 had excellent dentition from the functional point of view, with comparatively few carious teeth and no abnormal tartar formation. In the younger children the eruption of the permanent teeth was normal and in the right relation to their ages. Two of the children who presented normal mouths clinically had incipient parodontal lesions. The seventh, a young man (B.I.H. No. 8012A) with severe diabetes, receiving 68 units of insulin per day, had a marked parodontal condition with many carious teeth (Figs. 1 and 2). He developed gingival and parietal abscesses on two occasions, when the diabetes became uncontrolled because of dietary indiscretion or inadequate insulin dosage.

As a general rule the adult, dentulous, medically controlled patients whom we examined presented mouths which were unclean, owing to lack of oral hygiene, with heavy deposits of both supragingival and subgingival calculus (Figs. 3 and 4). These patients usually had a marginal type of periodontoclasia with a preponderance of the soft calcium carbonate type of tartar, which was most frequently deposited supragingivally.

The gingiva in this group is affected by calcular deposits and the mucosa may be anemic, congested, cyanotic or even hypertrophied. In other words, irritation of the gingiva by the tartar causes the same disturbances as those sometimes found in the mouths of normal individuals subject to tartar formation. Radiographically and clinically this group has a high incidence of diffuse alveolar atrophy. This is particularly true of the younger age group (twenty-five to forty-five), in which diffuse alveolar atrophy is not generally attributed to local causes.

Patients with acute or inadequately treated diabetes present a characteristic oral symptomatology.

It is manifested clinically in the gingival papillae, which become markedly swollen and tender, and bleed profusely on the slightest pressure. These cases present an additional symptom of importance, namely loosening of the teeth. This is associated with pain, especially on percussion. With control of the diabetes, the acute inflammatory condition of the gingiva subsides, the loosening of the teeth improves, and pain on percussion disappears. Extraction of teeth in the inadequately controlled diabetic patient results in a prolonged period of suppuration and pain. With medical supervision, however, healing proceeds in a normal manner.

The following cases are chosen to illustrate the condition of the mouth in patients with uncontrolled diabetes, acute and chronic; the futility of local treatment without attention to the underlying systemic disease, namely diabetes; and the remarkable improvement of the mouth condition following the control of the diabetes, without any special local treatment.

Case 1 (private case). C. V., a woman, aged 33, about 2 months previous to admission to Beth Israel Hospital noticed that the gingivae throughout her mouth had become markedly inflamed, were painful and bled easily. She could not take anything hot or cold without pain. She also developed polydipsia and polyuria. The patient thought that all her symptoms were due to her mouth condition and consulted a dentist, who prescribed a mouth wash and treated the gingivae locally with iodine. Her general condition as well as her mouth symptoms grew worse and she finally consulted a physician who made a diagnosis of diabetes mellitus and referred her to one of us (A. R.). Examination revealed a generalized inflammatory condition of the gums. The papillae were markedly swollen and there were excessive growths of polypoid tissue which protruded from under the free margin of the

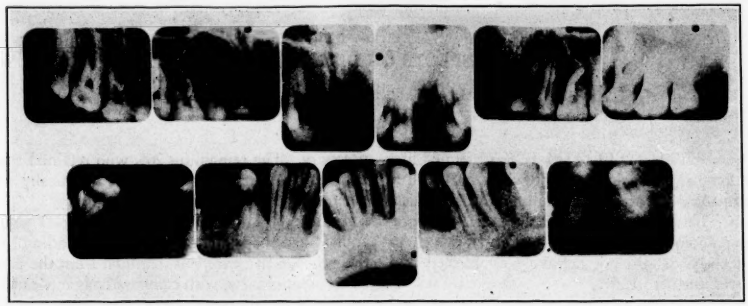

Figure 2. *X-ray films of the teeth of the patient shown in Figure 1. Note the bony atrophy, with complete loss of the bone in the lower incisor region.*

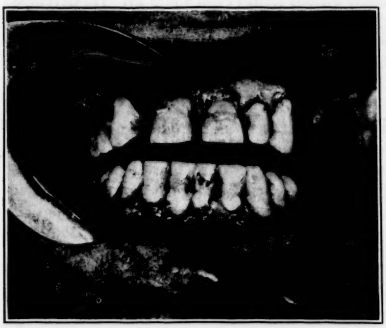

Figure 3. *Photograph showing abundant calculus formation in a thirty-eight-year-old, controlled diabetic patient.*

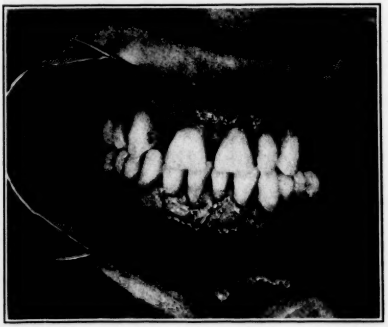

Figure 4. *The same mouth as in Figure 3 after local treatment had been instituted.*

gingiva. These tumorlike growths were much lighter in color than the rest of the gingiva and bled profusely on the slightest pressure (Fig. 6). With the control of the diabetes the acute inflammatory process in the mouth subsided. The polypoid proliferations, however, persisted for several months, finally disappearing completely, without any local treatment (Fig. 7).

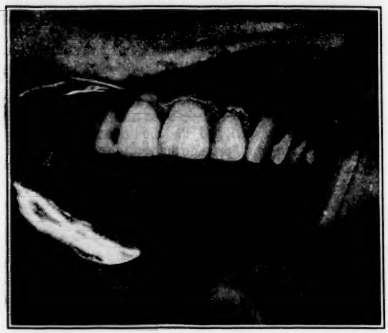

Figure 5. *Photograph of the mouth of a twenty-six-year-old woman with inadequately controlled diabetes, showing hypertrophied papillae. These papillae were painful and bled profusely on the slightest pressure.*

Case 2 (B.I.H. No. 4759A). I. S., a man, aged 45, developed polydipsia and polyuria, and at the same time noticed that his gingiva became inflamed and his teeth became extremely loose and painful. About a month before admission the upper teeth were removed because of pyorrhea and suppuration. The general condition grew worse and the patient finally consulted a physician who found sugar in his urine and referred him to the hospital. On admission the remaining lower teeth were loose and still painful. Although the pain in the mouth subsided, the looseness of the teeth persisted for some time. Radiographic examination of the jaws revealed a diffuse alveolar atrophy.

Case 3 (B.I.H. No. 48906). R. F., a woman, aged 50, became aware that with a general feeling of malaise the tissue lingual to the upper central incisors became swollen and very painful. She consulted a physician, who made a diagnosis of diabetes mellitus and referred her to the hospital. Examination of the mouth revealed a gingival abscess lingual to the upper central incisors, which had opened and was discharging pus. Pressure on this tissue caused pus to exude. Although the rest of the mouth appeared in excellent condition clinically, x-rays revealed definite alveolar atrophy. With the control of the diabetes, the mouth symptoms subsided.

Case 4 (B.I.H. No. 43806). A. K., a woman, aged 47, presented herself to the Out-Patient Department because of general debility and oral symptoms (painful and bleeding gums). A diagnosis of diabetes mellitus was made, and she was referred to the Diabetic Clinic for treatment. Examination of the mouth revealed a generalized inflammation of the gingivae, with many excessive growths of polypoid tissue from under the free margins. With the control of the diabetes, the mouth condition improved (Fig. 8).

In this group of patients with untreated and uncontrolled diabetes, the soft tissues in the mouth, as well as the parodontium, were involved. Often among the first symptoms which may suggest the disease are the gingival polypoid proliferations. The patient may also complain of pain and loosening of the teeth. Such patients, when observed by the dentist, should be questioned as to their general health, especially as to symptoms of diabetes, and referred for a medical examination, if necessary.

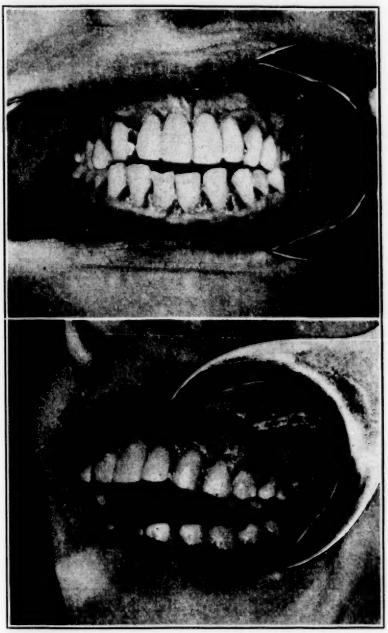

Figure 6. *Photographs taken on August 18, 1937, of the mouth of a thirty-three-year-old woman during the acute onset of diabetes. Note the inflamed papillae in the lower region and also the polypoid growths in the maxillary molar region.*

Local treatment in these cases will not prevent the disease processes in the mouth from growing worse. On the other hand treatment of the diabetes alone will often bring about a remarkable improvement in the oral condition. Many teeth can be saved by systemic treatment. Local treatment should be instituted only after the diabetes has been brought well under control.

DENTAL TREATMENT OF DIABETIC PATIENTS

Since many diabetic patients in the older age groups are edentulous, very little treatment is necessary. Old dentures may be adjusted to relieve tissue irritation, or if this is not possible, new dentures may be advised.

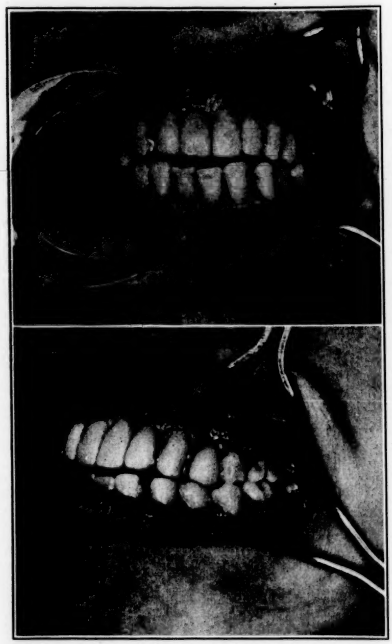

Figure 7. *Photographs taken on February 10, 1938, of the patient shown in Figure 6 after the diabetes had been controlled, showing inflammation of gingiva completely subsided. Note the complete disappearance of polypoid proliferation in the maxillary molar region.*

The children in the Diabetic Clinic have regular examinations at intervals of three months. X-rays are taken annually, so that comparative studies, especially of the parodontium, may be made. As a rule the adequately controlled diabetic has no trouble with his teeth or gingivae. Oral hygiene supplemented by scaling is the usual treatment. For diabetic patients with diffuse alveolar atrophy, much is to be gained by preserving the natural teeth as long as possible. The following case illustrates the value of proper control of diabetes in the preservation of the teeth.

Case 5 (B.I.H. No. 32595A). W. B., a man, aged 49, in May, 1933, became aware of the extreme looseness of many of his teeth and of gingival abscesses, which appeared spontaneously and disappeared without treatment. He also noticed that his mouth was dry and that his thirst and appetite increased greatly. His mouth was treated locally for some time without relief. Because of a sore throat he consulted a physician. In spite of his symptoms, the diabetes was not diagnosed until the patient came to the Out-Patient Department of the Beth Israel Hospital several months later. He presented a picture of acute diabetes with the characteristic oral symptomatology, namely, looseness of the teeth and gingival abscesses. His diabetes was easily controlled with diet and insulin. With the improvement of the diabetes, the oral symptoms gradually subsided and the teeth became firmer without any local treatment. An x-ray film of the mouth taken in 1935 revealed a moderate amount of bone atrophy. Parodontal treatment was instituted and the mouth was restored to a healthy condition. At present the teeth are still firm and in good condition.

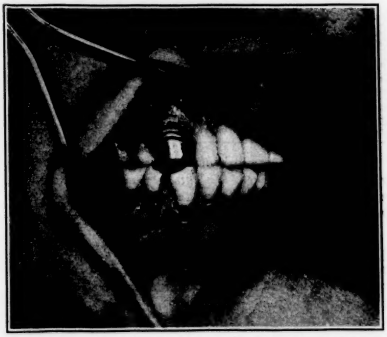

Figure 8. *Photograph of the mouth of a forty-seven-year-old woman with acute diabetes, showing inflammation of the papillae and polypoid tissue in the region of the lower right cuspid and premolar teeth.*

CARE OF DIABETICS DURING AND AFTER THE REMOVAL OF INFECTED TEETH

The adequate treatment of diabetes mellitus calls not only for the control of diet but also for the eradication of infectious processes. The action of the internal and external insulin may be diminished in the presence of infection. Hopeless, pyorrheal teeth, because of extreme looseness or suppuration, should be removed. No surgical procedure in the mouth is undertaken unless the diabetes is being adequately controlled. This limitation is essential for quick recovery and for the prevention of oral complications. During the extraction of teeth patients are apt to neglect their diet, insulin dosage or time of administration of the insulin. The food is often ingested hurriedly and chewed poorly. This may result in gastrointestinal disturbances or aggravation of the diabetes. Insulin reactions due to the omission of a meal, or diabetic coma due to the omission of

insulin, may be precipitated. Therefore, before any extraction is carried out the patient's condition is carefully checked in the Diabetic Clinic. He is referred to the dietitian for adjustment of the diet, which is made liquid and soft and of the same values as his usual diet. Before the first extraction the patient is given instructions as to the importance of adequate diet and insulin, and is advised to report to the physician as soon as any complication arises.

Diabetic patients with hypertensive or coronary arteriosclerotic heart disease receive special care. They are sent to the Emergency Ward and occasionally hospitalized. A 1 or 2 per cent solution of novocain without adrenalin is used for anesthesia. The patients remain in the Emergency Ward for as many hours as it is necessary for them to recuperate properly.

Diabetic patients in the medical and surgical wards are seen routinely in consultation. When their diabetic condition is under control, the necessary dental treatment is instituted. We have limited the number of extractions per patient to three teeth at a time, and in most cases to two. We have used novocain almost exclusively for anesthesia. A slow injection with not too extensive infiltration is necessary for the best postoperative results.

The importance of special care of the diabetic patient during and immediately following the extraction of teeth can be illustrated by the following case.

Case 6. (B.I.H. No. 42475A). D. C., a girl, aged 18, employed as a clerk in the hospital, presented herself at the Dental Clinic for the removal of an impacted third molar. She failed to inform the dental surgeon that she was a severe, uncontrolled diabetic patient and that she had not seen her physician for several months. Following extraction she omitted her insulin for 24 hours and became acutely ill. She was admitted to the hospital in diabetic coma. The diabetes was controlled and her recovery was uneventful.

In a clinical survey of 108 consecutive cases of diabetic coma at the Mayo Clinic, Baker[1] reports 2 cases of coma precipitated by the extraction of abscessed teeth. Extractions should never be carried out in the presence of uncontrolled diabetes, unless at the special request of a physician and under his supervision. It is generally known that the healing of wounds is somewhat delayed in patients with inadequately controlled diabetes. Bennett[2] has recently completed a study of surgical wounds in dogs made diabetic by pancreatectomy. He found that the healing of the wounds was abnormal whenever insulin was withheld. On the other hand, healing proceeded perfectly normally when the diabetes was well controlled.

Even a patient with completely controlled diabetes should be under the care of his physician during and following the extraction of teeth. Whenever a patient requires the extraction of many teeth, this should be carried out in several sessions. The proper interval between the extractions depends on the condition of the patient. While the removal of infected teeth ameliorates the diabetes, it may aggravate it if too many teeth are extracted at one time or if insufficient attention is given to the diet and insulin.

DISCUSSION

In the study of the mouth in diabetes mellitus, the question naturally arises as to whether the diabetes or the mouth lesions constitute the initiating factor. Kent,[3] in a study of 566 diabetic patients at the New England Deaconess Hospital during 1934, found that they had less caries than nondiabetic patients and were more disposed to tartar formation and periodontoclasia. Eighty-five per cent of 400 cases had varying amounts of tartar deposit and 60 per cent showed gingivitis. Kent did not, however, mention the condition of the diabetes at the time of examination. He believes that the destruction of the teeth and of the supporting processes is very active just prior to the onset of the diabetes. Our observation has been that this occurs simultaneously with the acute development of the diabetes or during an acute exacerbation of the disease. It is thus one of the manifestations of diabetes and, like pruritus vulvae and temporary visual disturbances, occurs frequently but not generally. It is probably due to the dehydration and the high sugar content of the tissues, which lower the tissue vitality and its resistance to infection. Some writers believe that the mouth condition has a characteristic appearance and speak of "diabetic periodontoclasia," and so forth. Williams[4] divides diabetic stomatitis into two types, one found in patients with acute diabetes and the other in those in whom the diabetes has been kept under control. Hirschfeld[5] believes that whenever acute gingival abscesses and subgingival proliferations, or both, are found in the mouth of a patient, the presence of diabetes mellitus should be suspected. He has observed also that the condition of the mouth has greatly improved, and in some cases completely cleared up, with the treatment of the diabetes, without any local treatment. Our observations agree with those of Hirschfeld: the mouth presents the characteristic pathologic picture that may be found in any debilitating disease, but the condition is especially common in diabetes, in which event it subsides only with the treatment of the underlying cause, namely the diabetes. It can be compared to pruritus vulvae, which also does not respond to local treatment and clears up only after treatment of the diabetes is instituted. The fate

of the teeth of the diabetic patient is thus in the hands of the physician and the dentist. With proper co-operation, the teeth can be saved and kept in good condition indefinitely. The dentist should learn to recognize this condition and refer the patient for medical care, while the physician should always control the diabetes before he refers the patient for dental care, unless an emergency extraction is indicated.

The diffuse alveolar atrophy which has been observed in controlled diabetic patients, as well as in uncontrolled, is probably not related to the glycosuria and hyperglycemia, but to some other metabolic disturbance which accompanies diabetes. It may be due to a mineral or vitamin deficiency, since many of the patients are on restricted diets for long periods of time, or have lost a great deal of weight. A correction of this factor by the administration of a high-vitamin and high-mineral diet, with vitamins and minerals added in concentrated form, is essential.

SUMMARY AND CONCLUSIONS

The condition of the mouths of 403 diabetic patients has been studied and is discussed in detail.

It was found that children have comparatively few carious teeth, with no abnormal tartar formation, although this group is too small to make definite conclusions.

Dentulous, controlled, adult diabetic patients have, as a rule, heavy tartar deposits, usually supragingivally deposed.

Periodontoclasia is very prevalent; it is usually associated with poor hygiene, and in a very high percentage of cases is of the marginal type. In younger diabetic patients there is a high incidence of diffuse alveolar atrophy, which can hardly be attributed to local causes.

The parodontium of patients with untreated or inadequately controlled diabetes presents a characteristic picture: namely, loosening of the teeth and pain; hypertrophied, inflamed gingival papillae; bleeding and pain of the gingiva and parodontium; gingival abscess; and excessive polypoid proliferations growing from under the free margin of the gum.

The treatment of the diabetes should precede the local treatment of the gingivae or teeth. The teeth should be saved whenever possible.

Infected teeth may aggravate the diabetes and should therefore be removed.

Extraction of teeth should be carried out on controlled diabetic patients only, and under the supervision of a physician. Neglect in these regards may result in serious complications.

311 Commonwealth Avenue.

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THE MAXIMUM TEMPERATURE OF EXPIRED AIR AS A RAPID MEASURE OF HUMAN BODY TEMPERATURE

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TO FURTHER the use of body-temperature measurements in the control of disease, especially at times of school epidemics, a method for rapidly measuring the body temperatures of large groups of individuals is urgently needed. Benedict and Benedict[1] have briefly reported a thermoelectric principle for obtaining the body temperature by measuring the maximum temperature of the air expelled from the lungs in a single expiratory blast. The apparatus here described makes it possible to determine the body temperature of an individual in only a few seconds; hence it is particularly adapted for measuring the temperatures of groups such as school children.

The early literature on the temperature of expired air was reviewed by Liljestrand and Sahlstedt[3] in 1925, and since that time only a few additional studies have been made.[2, 4, 5, 7, 8] In the literature the temperatures of expired air have been reported without information regarding the particular phase of the respiratory blast at which the temperatures were measured. Because the air leaving the respiratory passages has a wide range in temperature becoming progressively warmer as expiration proceeds, it is impossible to interpret these early studies intelligently or to compare their results with the maximum temperatures obtained by our technic.

APPARATUS‖

In the application of the thermoelectric principle to the measurement of the maximum temperature of expired air it is necessary, because of the short duration of an expiration, that wires of extremely small mass be used, to ensure that they shall instantly acquire the temperature of the air expired. For the same reason a galvanometer having a period not exceeding two seconds must be employed. A photograph of the apparatus as used at the Nutrition Laboratory is reproduced in Figure 1, and a detailed drawing is shown in Figure 2. To both ends of a 1.5-m. length of No. 40 (0.08 mm.) double silk-covered, constantan wire are soldered pieces of No. 40 enameled copper wire totaling 1.5 m. in length. These fine wires, held by a minute bit of solder (half lead and half tin) form junctions or thermocouples of small mass. One of the junctions, *R*, is maintained in the constant temperature unit, *O*. The other junction, *J*, is housed in a stiff cardboard tube, *P*. When air from the lungs is blown through the tube, the junction instantly assumes the temperature of the air passing over it and follows its variations. To avoid having the circuit of excessively high resistance, heavier copper wires (No. 18) are used to connect the thermocouples with a double-pole, copper knife switch, *S*, and then with a galvanometer, *G*, which completes the circuit. When the switch is closed, the current set up by the temperature differences is registered by the galvanometer.

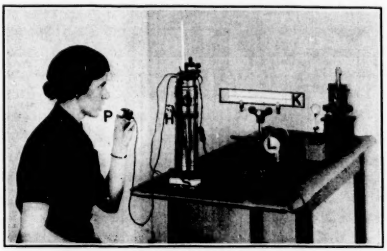

Figure 1. *Apparatus for Rapid Measurement of Maximum Temperature of Expired Air.* O, *constant temperature unit;* P, *cardboard tube that houses and protects the measuring junction;* S, *double-pole, copper knife switch connecting the thermocouples with the galvanometer;* H, *brass holder for the measuring junction when not in use;* G, *galvanometer;* L, *projected light for reading galvanometer deflection on scale,* K.

Measuring Junction. To make the delicate measuring junction, *J*, a usable and durable instrument, a special protection to permit handling it is necessary. The two insulated wires that form this thermojunction are protected by being encased in a fine-rubber tubing, *N* (inside diameter 2.4 mm., thickness of wall 0.8 mm.), which extends from the point where the wires leave the vacuum bottle to within 40 mm. of the measuring junction. The last 90 mm. of the portion of the wires encased in the tubing is passed through a 9-mm. brass tube, *V*, and secured inside it by filling the tube with wax. The fine-rubber tubing is

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§Member of the staff, Nutrition Laboratory.

‖We express our appreciation to Mr. V. Coropatchinsky of the Nutrition Laboratory staff, who constructed for us many of the parts of this apparatus.

in turn encased in a tube of synthetic rubber,* *M*. The larger tubing, shown in part in Figure 2, will bend readily, but is tough and can be stretched only with great difficulty.

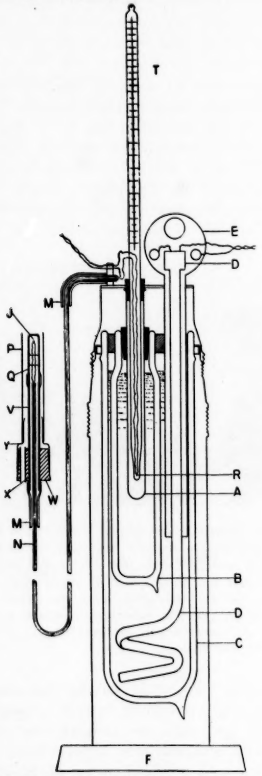

Figure 2. *Details of Construction of the Constant-Temperature Unit and the Thermojunctions. The constant-temperature junction,* R, *is inserted into the test tube,* A, *which in turn is inserted into the vacuum bottle,* B, *contained in the larger vacuum bottle,* C. F, *iron base for constant temperature unit;* T, *thermometer to indicate temperature of junction,* R; D, *electric heater;* E, *bimetallic thermostat;* J, *the measuring junction, the wires of which are protected by the rubber tubings,* N *and* M, *the brass tube,* V, *and the U-shaped guard,* Q. *The mouthpiece,* P, *is supported by the brass reducer,* Y, *which fits over the rubber stopper,* W, *through one hole of which passes the brass tube,* V, *and through the other hole the glass tube,* X, *which offers a slight resistance to expiration.*

Care is taken to avoid factors having variable effects on the temperature that is being measured. If the expired air comes in contact with a material of high thermal conductivity before or at essentially the same time as it comes in contact with the measuring junction, there will be an error in the direction of too low a temperature measurement, its magnitude depending on the environmental conditions. As the brass tube extends only

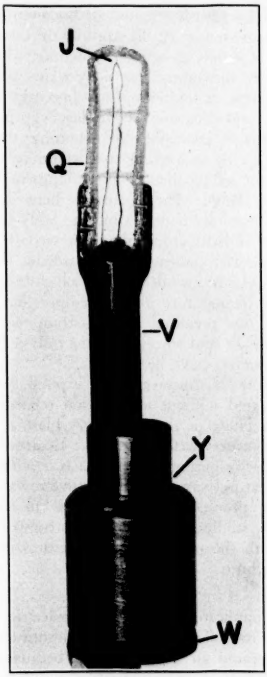

Figure 3. *The Measuring Junction.*

to a point 40 mm. from the measuring junction, there is no possibility of an absorption of heat by the metal before the junction assumes the temperature of the surrounding air.

To support the delicate wires and prevent their being broken, a U-shaped guard, *Q*, is fastened to the brass tube and runs parallel to the junction wires, projecting 4 mm. beyond the junction (Fig. 3). This guard has a low thermal conductivity and is made by impregnating and coating a piece of light, soft, mercerized crochet cotton with a cellulose cement.† Two threads extending between the uprights of the guard provide additional

*Obtained from Fisher Scientific Company, Pittsburgh, Pennsylvania.

†Duco household cement.

support for the junction wires. The loop at the end of the guard is bent in a plane perpendicular to the rest of the guard (forming a semicircle), to permit the expired air to come directly in contact with the junction.

Mouthpiece. The brass tube, *V*, fits into a suitable hole at one side of a rubber stopper, *W*, which has been split down the length of the hole to permit the insertion and removal of the tube. The larger end (25 mm. outside diameter) of a brass reducer, *Y*, is fitted over the rubber stopper, and the other end serves to support the mouthpiece, *P*, which is a cylindrical cardboard tube, 15 mm. in diameter and 85 mm. in length. The cardboard used for the mouthpiece is stiff enough (approximately 1.5 mm. thick) to prevent an excitable child from inadvertently biting or crushing the measuring junction. The rubber stopper is adjusted so that the mouthpiece, when in place, extends 10 mm. beyond the junction. The shoulder of the reducer holds the mouthpiece in the correct position, and a slight taper at the end of the reducer permits rapid replacement by fresh tubes. Cardboard tubes are used not only as a sanitary measure but because, owing to their low thermal conductivity, more accurate temperature measurements are obtained than with glass or metal ones. Our orientation experiments showed that use of glass or metal tubes caused an error in the temperature measurements, which varied with the room temperature, but when a cardboard tube was employed for the junction housing, varying room temperatures had no effect on the measurement of the maximum temperature of the expired air.

The only outlet for the air expired into the cardboard tube is a second hole in the rubber stopper. A 25-mm. length of glass tubing, *X*, having an inside diameter of 4 mm., is inserted into this hole and offers a slight resistance to the expiration, which tends to make the rate of expiration more uniform and to prevent too rapid passage of the air by the junction.

Reference junction. It is necessary at all times to know the temperature of the reference junction, *R*. It is therefore fastened with thread to the mercury bulb of a calibrated thermometer, *T*, and the wires are fastened at two or three points along the stem of the thermometer.

Constant temperature control. For convenience and accuracy in making temperature determinations it is essential that the reference junction be maintained at a constant temperature, preferably a little below the temperature to be measured. To obtain this condition the thermometer, with the junction attached, is inserted in a test tube, *A*, approximately 12 mm. in internal diameter and 150 mm. long. Cotton batting is tucked in between the thermometer and the walls of the test tube to prevent air currents. The thermometer and the thermojunction wires are secured by fitting them into a rubber stopper, which seals the test tube. The test tube is then suspended in a small (130-cc. capacity) vacuum bottle, *B*, and is held by a rubber stopper in the mouth of the bottle. The latter is, in turn, placed inside a 900-cc., wide-mouthed vacuum bottle, *C*, and is held in position at one side of the bottle by a cork stopper. Both these vacuum bottles are filled with a light mineral oil. At the other side of the larger bottle and also held in place by the stopper is an electric heater, *D*, and a thermostat, *E*.* The heater consists of 6 m. of coiled nichrome wire, insulated with asbestos and having a carrying capacity of 0.6 ampere, and is housed in a copper tube (8 mm. internal diameter), sealed at one end. This tube extends down into the bottle and is coiled at the bottom. The thermostat is connected in series with a 75-watt bulb. This heating device, adjusted for the desired temperature, usually 95°F. (35°C.), will maintain the temperature of the reference junction from day to day within a maximum range of 2 to 3°F.†

The metallic case of the larger vacuum bottle is fastened to an iron base, *F*, to prevent its being overturned. On the side of the bottle is a brass clamp or holder, *H*, for holding the measuring junction when not in use.

Galvanometer. As the time available for measuring the temperature of the expired air, that is, the duration of the expiratory blast, is only five seconds at most, it is necessary that the galvanometer not only be extremely sensitive but also have a very short period. A Moll type of galvanometer,‡ *G*, with lamp, *L*, and glass scale, *K*, has been most satisfactory in fulfilling these requirements. The sensitivity of this galvanometer, when a 40-ohm external resistance is used, is 76×10^{-8} volts per millimeter deflection at a scale distance of 1 m., the period is 1.3 seconds, and the internal resistance is 55 ohms. The galvanometer can be critically damped by an adjustable magnetic shunt for an external resistance up to 160 ohms. A 60-ohm external shunt across the galvanometer was used in our measurements with this instrument. At a scale distance of 120 cm. a deflection of 21 mm. per degree Fahrenheit was obtained. A telescope-type, portable d'Arsonval galvanometer§ (sensi-

*A 125-watt immersion regulator manufactured by Eberbach and Son Company, Ann Arbor, Michigan.

†The temperatures in this report are expressed as degrees Fahrenheit instead of degrees Centigrade (the customary style of the Nutrition Laboratory) because it is expected that the greatest use of these results will be by those to whom the Fahrenheit scale is more familiar.

‡Manufactured by P. J. Kipp and Zonen, Delft, Holland.

§Manufactured by Leeds and Northrup, Philadelphia, Pennsylvania.

tivity 20 microvolts, period 3 seconds, resistance 20 ohms coil and 80 ohms damping) has also been used. Although not so sensitive as the Moll galvanometer, it is portable and hence in many cases is more practical and yet sufficiently accurate. To make possible a more precise reading of the deflection of the d'Arsonval galvanometer, the scale was placed at twice the originally designed distance, at which a deflection of 3.4 divisions per degree Fahrenheit was obtained.

Switch. A double-pole, copper knife switch, *S*, is employed in the leads to the galvanometer and is left open except during actual measurements. This switch is closed as the subject starts to exhale, and as the difference between the temperature of the reference junction and the maximum temperature of the expired air is small (usually only 2 or 3°F.), the tendency for the galvanometer deflection momentarily to exceed the true point of deflection is practically eliminated.

CALIBRATION

In order to determine the temperature equivalent of the galvanometer deflection, which registers in millimeters the difference between the temperature of the reference junction and that of the expired air, it is necessary to calibrate the instrument in the position in which it is to be used. The cardboard tube is removed from the measuring junction. The junction is held within 3 or 4 mm. of the mercury bulb of a thermometer and at its mid-level, and together these are immersed in a water-filled vacuum bottle. The temperature of the water should be that of the body or a little higher, at least 3°F. above the reference junction temperature. The thermometer and the junction are held approximately in the center of the bottle, and the water around them is stirred by blowing through a small rubber tube (2 mm. in diameter). The switch is closed and the water stirred until the readings of the thermometer and the galvanometer deflection are constant. In addition to noting these two readings, the reference-junction temperature is noted and the switch is opened to obtain the zero reading of the galvanometer. From these four readings the temperature change per millimeter deflection can be calculated, as illustrated in the following example:

Calibration thermometer	100.94 — 0.18 =	100.76°F.
Reference thermometer	94.86 ± 0.00 =	94.86°F.
	Difference =	5.90°F.

Galvanometer deflection	324 mm.
Galvanometer zero	200 mm.
Total deflection =	124 mm.

Hence, 124 mm. = 5.90°F., and

$$1 \text{ mm.} = \frac{5.90}{124} = 0.48°\text{F.}$$

To ensure an accurate and constant calibration of a delicate electrical instrument of this type, the galvanometer should be allowed to acquire the temperature of its environment before being used. A recalibration must be made if the apparatus is moved to even the slightest extent, and it is well to make a daily calibration to guard against any possible error.

If an apparatus equipped with the Moll galvanometer is permanently installed, the scale may be calibrated and marked to read directly in degrees. When such an arrangement is used, it is necessary only to set the zero point at the temperature of the reference junction, which can be easily accomplished by means of a ratchet on the holder of the galvanometer scale. Slight adjustment of the zero point will take care of fluctuations that may occur in the reference-junction temperature. A direct-reading scale cannot be used with the portable galvanometer, as the calibration factor may change from day to day.

PROCEDURE

From the standpoint of the person whose temperature is to be measured, the procedure is simple. It can be carried out easily even by a five-year-old child. The subject inhales through the nose, drawing a breath into the lungs to a moderate depth and holding it for five seconds; if desirable, the nostrils may be closed by the subject's fingers. At the end of this time (indicated by the operator) the subject quickly puts the cardboard tube into his mouth, closes his lips about the tube, and exhales through the mouth. The period from the time when the operator gives the subject instructions to inhale to the time when the measurement is completed is but fifteen seconds. Because of the slight resistance to expiration offered by the glass tubing, *X* (Fig. 2), the exhalation may be slightly forced.

From the technical standpoint the procedure is likewise simple. When the subject begins to exhale into the paper tube, the switch is closed and the maximum galvanometer deflection is noted. If a scale that reads in degrees is not used, the reference-junction temperature and the zero galvanometer reading are noted. The maximum temperature of the expired air can then be easily calcu-

lated by multiplying the total deflection of the galvanometer (difference between the galvanometer deflection and the zero) by the calibration factor and adding the result to the reference temperature. If the apparatus is to be used chiefly for eliminating from a group those individuals having a febrile temperature, it would be practical to have a marker placed on the galvanometer scale to indicate the upper limit of normal temperatures. Any deflections above this upper limit would challenge attention because representative of a suspected febrile condition.

The conditions existing prior to measurement play an important role in obtaining true results. Muscular exercise sufficient to increase the respiratory exchange appreciably will pronouncedly lower the maximum temperature of expired air, although the body temperature is practically unaltered. Breathing of cold air at or below freezing temperature will lower the maximum temperature from 1 to 2°F. It has been proved, however, that repose for fifteen minutes in a comfortably warm room offsets the effects of breathing cold air and of muscular exercise, unless the activity has been unusually severe. The drinking of cold liquids will likewise lower the temperature of expired air, but ten minutes of nose breathing at a comfortable room temperature will overcome any lowering from such cause. At ordinary room temperatures the lowering due to mouth breathing is not overcome until after four to six minutes of nose breathing.

At room temperatures from 54 to 77°F., if the subject has not been affected by any of the above-mentioned factors, a preliminary two-minute period of nose breathing without talking ensures a condition for correct measurement. Although this causes a delay for the particular subject concerned, it adds little to the total time required to measure the temperatures of a large group of individuals, for while favorable conditions are being established with the given subject, measurements may be made on other subjects who have already fulfilled this requirement.

DEGREE OF CONSTANCY IN REPEATED MEASUREMENTS ON THE SAME SUBJECT

One requirement was to establish a procedure for the subject that, when repeated, would give consistent results. It has been found that the most constant and reproducible condition (unless complicated by conditions described in the foregoing paragraphs) is obtained by a two-minute period of nose breathing without talking, followed immediately by a moderately deep inhalation through the nose, the holding of the breath for five seconds and then a normal or slightly forced exhalation. The deep inspiration ensures sufficient air and time to make the measurement. The holding of the breath for five seconds is not fatiguing and allows the inspired air to acquire a representative, definite temperature. Although this procedure may not be satisfactory for study of the variations in the temperature of expired air, it is recommended for measurement of the maximum temperature because of the proved constancy in the results thus obtained. The latter feature is shown by a series of eleven consecutive measurements on Subject 1, in which the maximum temperature of expired air ranged from 96.2 to 96.5, a variation of only 0.3°F. Twenty-eight measurements of the maximum temperature of expired air were made with 4 subjects, each measurement being made in triplicate (Table 1). The maximum variation on any one day was 0.5, but on the average it was only 0.2°F.

Table 1. *Degree of Constancy in Maximum Temperature of Expired Air.*

SUBJECT AND DATE 1938	EXPIRED-AIR TEMPERATURES (2-MIN. INTERVALS) °F.	EXTREME VARIATION IN EXPIRED-AIR TEMPERATURES °F.
SUBJECT 1		
Jan. 4	96.4 — 96.6 — 96.8	0.4
" 5	96.8 — 97.0 — 97.2	0.4
" 6	96.8 — 96.9 — 96.9	0.1
" 8	97.1 — 96.9 — 97.1	0.2
" 15	96.6 — 96.9 — 96.9	0.3
" 17	96.7 — 96.8 — 96.8	0.1
" 18	96.7 — 96.9 — 97.0	0.3
" 19	96.9 — 96.9 — 96.9	0.0
" 20	96.4 — 96.6 — 96.9	0.5
" 25	96.8 — 96.8 — 96.9	0.1
Feb. 7	96.2 — 96.4 — 96.3	0.2
" 16	96.4 — 96.6 — 96.8	0.4
SUBJECT 2		
Jan. 4	97.3 — 97.3 — 97.2	0.1
" 8	96.6 — 96.9 — 96.9	0.3
SUBJECT 3		
Jan. 4	97.0 — 96.8 — 97.0	0.2
" 5	96.8 — 96.8 — 96.9	0.1
" 6	96.5 — 96.7 — 96.7	0.2
" 8	96.9 — 97.0 — 96.7	0.3
" 15	97.3 — 96.8 — 96.8	0.5
" 17	96.2 — 96.4 — 96.4	0.2
" 18	96.8 — 96.7 — 96.5	0.3
" 19	97.4 — 97.3 — 97.1	0.3
" 20	97.7 — 97.6 — 97.6	0.1
" 25	97.7 — 97.8 — 97.8	0.1
Feb. 7	97.3 — 97.3 — 97.4	0.1
" 9	97.2 — 96.9 — 97.1	0.3
" 16	96.2 — 96.2 — 96.4	0.2
SUBJECT 4		
Jan. 4	96.8 — 96.9 — 97.0	0.2

It may be concluded that repeated measurements of the maximum temperature of expired air by the prescribed procedure will give results that agree within 0.5 and more often within 0.2°F. of each other. In view of the normal fluctuations in the temperature of the body, the latter variation is insignificant.

RELATION OF MAXIMUM TEMPERATURE OF EXPIRED AIR TO TRUE BODY TEMPERATURE

From the data in Table 1 it is seen that the maximum temperature of expired air, although reasonably constant, is consistently lower than the commonly accepted normal mouth temperature of 98.6°F.* In order to use the maximum temperature of expired air as an indication of the body temperature, its relation to the true body temperature must be established. In spite of the general use of the mouth temperature by the physician, the rectal temperature is the most reliable index of body temperature and is used for physiological measurements whenever possible. Because of its reliability, we have used the rectal temperature as the standard or true body temperature with which to compare the maximum temperature of expired air was 2.2°F. lower than the rectal temperature.

Of these thirty-four measurements only one rectal temperature (100.0°F. with Subject 3 on January 25) indicated a febrile condition, and although the maximum temperature of expired air in this case was 2.3°F. lower than the rectal temperature, it cannot be assumed from this one case that the already established average difference of 2.2°F. would always obtain at high body temperatures.

Through the kindness of Dr. Harry C. Solomon, chief of the Fever Therapy Department of the Boston Psychopathic Hospital, and the co-operation of Dr. Israel Kopp of the same department, we were able to make measurements on 4

Table 2. *Relation of Maximum Temperature of Expired Air to Rectal Temperature in Fever.*

Physically Produced Fever				Fever Following Injection of Typhoid Vaccine			
Subject and Time	Rectal Temperature*	Maximum Expired-Air Temperature	Difference	Subject and Time	Rectal Temperature†	Maximum Expired-Air Temperature	Difference
	°F.	°F.	°F.		°F.	°F.	°F.
Subject 7				Subject 9			
1:10 p. m.	105.8	102.7	3.1	9:50 a. m.	98.4	96.4	2.0
1:21 "	105.9	102.8	3.1	2:09 p. m.	102.4	100.3	2.1
2:29 "	100.0	98.4	1.6	2:37 "	103.2	100.4	2.8
3:27 "	99.4	96.9	2.5	2:47 "	102.9	100.8	2.1
Subject 8				Subject 10			
9:23 a. m.	98.0	95.6	2.4	10:54 a. m.	98.8	97.0	1.8
10:36 "	105.2	103.5	1.7	1:37 p. m.	102.0	100.0	2.0
1:18 p. m.	100.0	98.1	1.9	3:06 "	101.8	100.1	1.7
1:38 "	99.4	97.7	1.7	3:30 "	101.4	99.4	2.0
				3:57 "	101.4	99.0	2.4

*The rectal temperature of Subject 8 at 9:23 a. m. was measured with a clinical thermometer regularly used at the hospital. The other temperatures in this column were obtained by a Leeds and Northrup electrical-resistance thermometer.

†All rectal temperatures in this column were measured with clinical thermometers regularly used at the hospital.

the maximum temperature of expired air. Calibrated clinical thermometers were employed, and care was taken that the thermometer was not too cold when inserted into the rectum, that it was inserted deeply enough to make sure the record was not affected by the temperature of the outside air, and that it was left in place long enough to register the true temperature.

The expired air temperature measurements reported in Table 1 were accompanied by rectal temperature measurements. In addition to these, six measurements with 2 new subjects were made (not appearing in Table 1 because there were not three successive measurements of the temperature of expired air). Comparison of the first measurement of the expired-air temperature in each case with the rectal temperature shows that the greatest difference between the two, 3.0°F., occurred twice; the minimum difference was 1.2°F. On the average,

*Observations of other investigators indicate that, on the average, the temperature of the mouth is 0.7°F. lower than that of the rectum.[6] In our own series fifty-one simultaneous measurements of mouth and rectal temperatures with 7 subjects confirmed this average difference.

of their patients (Table 2). Two of these had fever induced by the electric inductotherm and radiant luminous heat combined, and the other 2 were given injections of typhoid vaccine. Measurements of the maximum temperature of expired air and of the rectal temperature were made in each case either before or after the fever therapy, as well as during the fever. At the highest temperatures the patients were uncomfortable and found it difficult to co-operate in the measurements, but the maximum variations shown in Table 2 are only slightly higher than those reported for subjects with normal temperatures. The important finding is that under febrile conditions the average difference between the maximum temperature of expired air and the rectal temperature is the same as it is under conditions of normal temperature, that is, 2.2°F.

The differences between expired-air and rectal temperatures in both normal and febrile conditions have been plotted in Figure 4 with reference to the rectal temperature. Although the scatter of

the points is seemingly wide, close examination indicates that in only one measurement is the deviation from the average line as great as 1°F. and that four fifths of the points are within ±0.5°F. of the average. By adding 2.2°F. to the maximum temperature of the expired air it is therefore possible to obtain a measurement within ±0.5°F. of the true body temperature. This is as accurate as mouth-temperature measurements, and in the case of children perhaps more accurate. It must

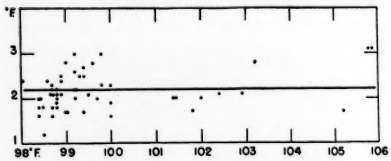

Figure 4. *Difference between Maximum Temperature of Expired Air and Rectal Temperature Referred to Rectal Temperature. The line at 2.2°F. represents the average difference between the two temperatures.*

not be forgotten, however, that in order to obtain reliable maximum temperatures of expired air the prerequisites already stated must be maintained.

SUMMARY

A thermoelectric principle, employing an extremely sensitive, practically aperiodic galvanometer in conjunction with two thermojunctions of fine constantan and copper wires, is used to indicate the body temperature by measuring the maximum temperature of the expired air.

For fifteen minutes prior to measuring the maximum temperature of expired air, exercise, breathing of cold air and drinking of cold liquids are to be avoided. Following a two-minute period (at ordinary room temperature) during which the subject neither talks nor breathes through the mouth, a moderately deep breath is taken, held for five seconds and exhaled into a cardboard tube surrounding the measuring junction.

Fifty-one observations with 10 subjects show that for both the normal and the febrile states the rectal temperature may be estimated to within ±0.5 by adding 2.2°F. to the measured maximum temperature of expired air. These measurements may be made at the rate of four per minute, which makes it possible to survey large groups of individuals within a relatively short time. The method seems to be particularly applicable to temperature measurements on school children during epidemics of "colds" and influenza.

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CHRONIC ARTHRITIS OF THE SHOULDER

Diagnosis and Treatment

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CHRONIC ARTHRITIS of the shoulder joint is one of the less common but one of the more disabling involvements of the locomotor system. Slight proliferative changes about the margin of the glenoid cavity and degenerative changes in the tendonous attachments in this region are commonly observed in the aged[1] but usually give rise to no symptoms. In the records of the Robert B. Brigham Hospital, chronic arthritis of the shoulder was observed in less than 10 per cent of the patients. The shoulders were involved in 165 persons out of 1765 suffering from atrophic arthritis, and in 42 patients out of 641 with hypertrophic arthritis. It was found with equal frequency at all ages and in both sexes. It was observed most often in association with chronic arthritis of the spine (Strümpell-Marie type). Slightly more than half the patients suffering from this disease had shoulder involvement in addition.

Both shoulders are as a rule affected, although one may be affected more seriously than the other. Involvement of one shoulder as the only joint was observed in 2 patients with hypertrophic arthritis. In 5 patients the shoulders were the only joints involved, and in 3 the upper extremities alone showed arthritis. But this distribution is rarely observed. Occasionally a strain may be the final cause of the symptoms in the shoulder joint, which are then continued by the chronic arthritis. Normally the shoulder is one of the later joints to be attacked in the course of this disease.

The pathologic changes in the shoulder joint are similar to those in other joints, but the symptoms are greatly out of proportion to the changes which can be discovered clinically or in roentgenograms. This is probably due to the difficulty which the patient has in immobilizing the shoulder girdle with his muscles. Rapid destruction of the shoulder joint is rarely seen. It was observed in 3 children who had an extremely severe chronic arthritis. Severe articular damage in roentgenograms was seen in 11 patients only. Ankylosis of the shoulder occurred in 6 patients, and there was a unilateral subluxation of the shoulder in 1. Extensive pathologic changes were commonly seen in the acromioclavicular joint, but ankylosis in this joint was not found in any patient.[2] No evidence of complete rupture of the supraspinatus tendon was observed in any patient.

In most cases the diagnosis of arthritis of the shoulder joint should not be difficult. A history of pain and disability in other joints is generally given; chronic arthritis of the shoulder is rarely an early manifestation of that disease. The one exception to this is hypertrophic arthritis, in the course of which symptoms may appear in the shoulder after trauma. The story is that of gradually increasing limitation of motion in all directions, but more especially in abduction and external rotation. The pain is dull in character, constant, but aggravated by motion, and is indefinitely localized to the shoulder area. There is less sharp localization of pain than is seen in ligamentous sprains or bursal affections.[3]

Most of these patients are in the age group in which strain and bursitis are most commonly seen, and one must remember that bursitis and injuries may occur in a shoulder when chronic arthritis is also present. Acute subacromial bursitis occurred in 3 patients who had chronic arthritis of the shoulder joint. Chronic arthritis elsewhere in the body can sometimes produce pain in the shoulder region. Arthritis of the cervical spine may give rise to pain which radiates over the region of the shoulder. Arthritic deformities of the elbow can lead to strain of the muscles of the shoulder since the arm must be used in an awkward manner.

Muscular atrophy is an early and constant feature. Only in the prolonged immobilization of fractures is as extensive wasting of muscles found. In 1 patient there was such marked wasting and weakness of the musculature that poliomyelitis was at first suspected. Fortunately, all this wasting disappears under appropriate therapy. The muscular atrophy, as in most chronic affections of the shoulder, involves all the muscles about the shoulder girdle, but the abductors and external rotators of the shoulder joint are most severely affected; however, it is helpful in diagnosis only in its more rapid progression in chronic arthritis (Fig. 1).

There is rarely any palpable swelling. The joint is so completely covered by muscles that the increase in articular fluid and the thickening of the articular capsule cannot be felt. Marked swelling

From the Robert B. Brigham Hospital.
*Chief-of-staff, Robert Breck Brigham Hospital.

is seen only in such conditions as tuberculous or suppurative arthritis, never in chronic arthritis. Tenderness is not often encountered, though it may be observed over the acromioclavicular joint when that joint is severely affected by arthritis. Tenderness over the ligamentous attachments indicates a ligamentous injury or tendosynovitis. In bursal affections there is tenderness just beneath the acromion. Widespread tenderness was observed in 2 patients first suspected of having arthritis, but 1 later proved to have trichinosis and 1 fibromyositis.

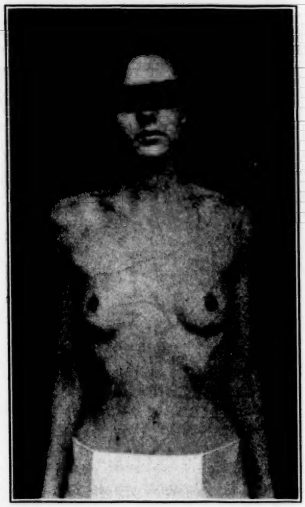

Figure 1. *Atrophic Arthritis: Extreme atrophy of the muscles about both shoulder girdles. The patient was unable to abduct the left arm.*

Limitation of motion is a helpful point in diagnosis. In an active arthritis of the shoulder joint, motion is limited in all directions, but in the later stages of the disease after contractures have occurred, this is most marked in abduction and to a lesser degree in external rotation. When the acromioclavicular joint is chiefly involved there is pain mainly on active motion but no limitation and very little pain on passive motion. In most bursal affections a wider range of motion is possible. Crepitus is commonly felt over the shoulder in chronic arthritis and is rarely observed in other conditions.

Roentgenograms at first show no changes. Later in atrophic arthritis there is atrophy of bone and disappearance of the articular cartilage. Calcification about the joint, apparently in the articular capsule, was observed in a number of patients. It is extremely difficult to make a diagnosis of ankylosis in roentgenograms; indeed it was suggested by roentgenograms in several patients who proved to have a fairly wide range of motion in the shoulder (Figs. 2 and 3). In hyper-

Figure 2. *Atrophic Arthritis of Fifteen Years' Duration. There is bony ankylosis between the humerus and scapula.*

trophic arthritis the commonest finding is osseous proliferation about the articular margin. Areas of absorption suggesting cysts are sometimes seen in the head of the humerus. Often the most extensive roentgenologic changes are seen not in the shoulder joint itself but in the acromioclavicular joint, which is always affected by a chronic arthritis in this region (Fig. 4). Areas of calcification beneath the deltoid muscle are not found in chronic arthritis alone. They suggest a bursal inflammation.

Laboratory data are usually of little aid in differential diagnosis, since many of the other conditions which produce disability in the shoulder joint can produce similar changes in the blood counts and sedimentation rate.

When arthritis is present in the shoulder joint it tends to be slowly progressive. If it remains untreated, the shoulder shows increasing limitation in motion until the arm is held rigidly at the side. The shoulder does not show the exacerbations of the disease which one commonly observes in weight-bearing joints, but there is also little tendency to spontaneous improvement. Often there is no pain and the patient is comfortable but is unable to care for his body or to put on his

clothes. Many of these patients when they came to the hospital had to be fed, and the putting on of clothes was painful and difficult. Additional

Figure 3. *Marked Destruction of the Shoulder Joint and Acromioclavicular Joint.* Attempts to manipulate the *shoulder during the active stage of the disease have produced calcification in the muscles and in the articular capsule.*

disability comes after the arthritis is quiescent from the effect of gravity and from disuse. Most of the disability at the shoulder can be prevented

Figure 4. *Hypertrophic Arthritis. There is marked osseous proliferation about the glenoid and the acromioclavicular joint.*

by persistent early treatment,[5] particularly by protection and splinting in a position of abduction.

When the shoulder joint is first attacked by chronic arthritis, its complete immobilization should be maintained until pain and muscular spasm have subsided. A sling or a swathe about the chest has been found inefficient since it does not keep the shoulder sufficiently at rest and quickly leads to contractures. The most effective immobilization has been secured with a plaster cast or metal splint holding the arm in 90 degrees of abduction (Fig. 5). When the disease is acute the patient wears this in recumbency. A light plaster-of-Paris splint can be made from strips about six layers thick applied to the side of the trunk and the abducted arm. A wooden strut is necessary to keep the arm in abduction. When the cast is dry it is bandaged to the side. Usually the patient is in bed for treatment of other joints and the systemic disturbances accompanying the arthritis. A simple and fairly effective splint when the patient is constantly in bed can be made with pillows and sandbags holding the arm in abduction and external rotation (Fig. 6),

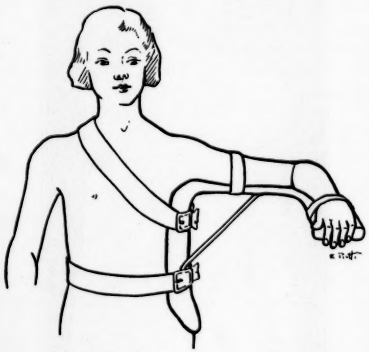

Figure 5. *Plaster Abduction Splint. This can be worn both in bed and while the patient is ambulatory.*

but this type of splinting requires frequent attention, for as the pillow becomes displaced the arm is brought against the side for comfort. Heat applied in any convenient form to the shoulder several times a day helps greatly in relieving muscular spasm and pain and probably hastens recovery. Massage, unless given very gently, adds to the discomfort during the early stages of the disease; later it is helpful and may be combined with active exercise to recover muscular strength. Immobilization with one of these forms of splinting is usually discontinued in one to three weeks, at which time muscular spasm disappears and painless motion returns. Active exercises should then be given to combat atrophy of the musculature and to prevent contractures, which take place chiefly in the adductor muscles. The wearing of an abduction splint may be necessary at night for

several months longer in order to keep full motion in the shoulder joint and prevent contractures. Where the patient is seen early and the systemic manifestations of the disease are also treated there is little tendency for the deformity to recur later on.

In the early stages of the disease, the treatment of the shoulder joint is similar for both atrophic and hypertrophic arthritis, that is, either in an acute attack of atrophic arthritis or in the disability which is observed in the hypertrophic type in elderly individuals, usually after trauma. Complete immobilization as described brings recovery most quickly. In the hypertrophic form of arthritis recovery is more rapid than in the atrophic form. But recurrences of the disability following slight injuries to the shoulder are more frequently observed in hypertrophic arthritis. The severe contractures and stiffening of the shoulder joint necessitating operative procedures are almost never observed in hypertrophic arthritis.

If no early treatment has been carried out

Figure 6. *Pillow Splint. This holds the arm in abduction and external rotation.*

and contractures have developed, more vigorous attempts must be made to regain motion in the shoulder. In the less severely contracted shoulder, abduction can be increased gradually by placing a pillow between the arm and the body. More pillows can be added as the arm comes into more abduction. Adjustable metal splints or plaster casts can also be used. New plasters are made when the patient can keep the arm comfortably in more abduction. Whatever method of stretching the contractures is used, it must be constant. Intermittent stretching is not effective. When a fair amount of motion has been obtained this can be increased by exercises. Rotation is most readily regained by pulleys at the head of the bed, through which a rope is passed with handles at both ends. These handles are pulled upon alternately by the patient while lying in bed, thus pulling the shoulders alternately in abduction or external rotation (Fig. 7). Exercises in swinging the arms in abduction and in elevating the arm at the shoulder are also helpful. At first there is less discomfort and more rapid gain in motion if exercises are taken with the body bent forward. In this position gravity aids in the movement of the shoulder.

One feature important both in the regaining of motion and in the prevention of later disability is the correction of the body mechanics.[7] When the body is well poised the muscles and skeletal structures are in the optimum position for function. A shoulder that is drooped and rotated inward, the usual position with faulty posture, shows changes in the origin and insertion of the supporting muscles as well as an internal rotation of the head of the humerus. The glenoid is tipped downward and no longer gives shelf-like support to the humeral head. In this position strain and contractures can most readily occur. With the regaining of the full motion an attempt should be made to correct the body mechanics.

When severe contractures have taken place from the atrophic type of chronic arthritis, splinting of the shoulder and active exercises will help little, if at all. When no increase in motion can be obtained by splinting and exercises, and the disease is quiescent, as shown by clinical examination and laboratory tests, manipulation of the shoulder is indicated. This should be performed under general anesthesia in order to secure full muscular relaxation. Abduction and external rotation should be corrected together, the shoulder

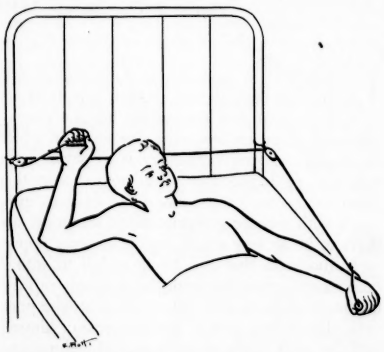

Figure 7. *Rotation Exercise. Pulleys have been fitted to the head of the bed with a rope permitting exercise of both shoulder joints while the patient is recumbent.*

being slowly rotated externally as the arm is brought out from the side. Great force should never be used. After manipulation, the shoulder is maintained in the corrected position with pillows, or preferably with an abduction splint, until the acute soreness produced by the manipulation has subsided. Then active exercises are given to

strengthen the musculature and maintain the improved position. Sometimes repeated manipulations are needed to secure the full range of motion.[8]

Where no motion is possible at the shoulder joint as the result of fibrous or bony ankylosis, fairly good motion through the scapular motion can be obtained with exercises. Where little abduction is possible it may be necessary to perform an osteotomy through the humeral neck. Attempts to produce a new joint at the shoulder have so far resulted in very unstable shoulder joints which have been quite inefficient for function. Arthrodesis of the shoulder joint is rarely necessary, since the pain quickly subsides with splinting and useful motion can then be regained. It is justifiable only in the rare cases of subluxation with marked disintegration of the joint.

SUMMARY

Arthritis of the shoulder occurs in about 10 per cent of patients suffering from chronic arthritis. It usually comes late in the course of the disease. The disability which it produces is much greater than the symptoms or the roentgenograms suggest. Diagnosis is not always easy. It can generally be made from the history of disability in other joints, the indefinite character of the pain, the absence of tenderness, the presence of crepitus, limitation of motion and pain on motion in all directions, and the roentgenograms. Treatment at first is complete immobilization with the shoulder in abduction, followed by exercises and heat to the shoulder. The general treatment of the arthritis is also essential. Manipulations and operative procedures are occasionally necessary in atrophic arthritis in order to regain function. In most instances disability can be prevented by adequate early treatment.

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THE TREATMENT OF CHRONIC BRONCHIAL ASTHMA

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IN ORDER to treat chronic bronchial asthma with more than average success, it is necessary to make certain that the patient has the disease. Although there are few other conditions in which the superficial symptomatology is so obvious, the very ease of diagnosis may lead us to forget that there are many other causes for a dyspnea associated with wheezing. Symptomatic treatment appears to be so very simple and is so often apparently successful that this too may lull us into a false security regarding both the diagnosis and the treatment of the disease. Every internist who practices allergy has seen a patient present himself with his own diagnosis of bronchial asthma and a story of intermittent or temporarily complete relief by simple antispasmodic measures, although the condition was not bronchial asthma. Maytum[1] has drawn attention to the fact that all those who wheeze do not have asthma and lists a number of conditions, as diverse as laryngeal spasm and the respiratory syndrome following encephalitis, all of which may simulate that disease.

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In this discussion we shall not concern ourselves with acute cases of asthma in which an injection of adrenalin brings such sudden and dramatic relief, nor with the cases of status asthmaticus in which adrenalin seems to be of little use and the therapeutic results, if any, are achieved by anesthetizing agents such as ether or Avertin,[2] which seem to act by direct muscular relaxation rather than by stimulation of the sympathetic nervous system.

Broadly speaking, the physician must decide by whatever means he has at his disposal whether the case is extrinsic or intrinsic. Although it is not likely that we shall discover many more extrinsic factors which are causing asthma in our so-called intrinsic type of patient, in whom the absence of positive skin tests is only one part of a completely different syndrome, nevertheless there are a great many patients who are labeled as having intrinsic bronchial asthma in whom extrinsic factors are present. Every case should be considered as extrinsic until completely proved to be otherwise. There are, of course, combined cases with asthma of long standing in which the external factors, if

any, have long since ceased to operate. Such tissue changes as are present have become irreversible, and a superimposed infection or a psychoneurosis may then play the chief role in initiating the attacks or in giving the patient continuous, mild symptoms. In some of these cases, persistent and thorough treatment by elimination of the extrinsic factors will nevertheless enable the body to throw off the superimposed difficulties. In others in which there is antrum disease, antral drainage may bring quick relief, but with rapid relapse unless the primary causative inhalants are eliminated from the environment or the guilty foods from the diet.

Our newest and most potent aid in the diagnosis of doubtful or complex cases is the modern air-conditioned hospital. The rooms for asthmatic patients are each air-conditioned, with the air under positive pressure as compared to the outside atmosphere. The temperature is constant, and the humidity low. The rooms are equipped with allergen-free furniture.

It has, of course, been known for many years that asthmatic patients are benefited by a change in environment. It has been believed that the improvement, especially when the patient was hospitalized, was due to the absence of inhalants and the ordinary sources of house dusts in the new environment. In our experience, this change was not always apparent in the ordinary hospital until after some weeks of hospitalization. We were never certain in some combined cases whether or not the patient was being benefited by the bed rest over a prolonged time. In the inhalant-free, air-conditioned room, four or five days are sufficient to free the case of extrinsic bronchial asthma of symptoms both subjectively and objectively, since the signs in the chest may entirely disappear. In our experience with intrinsic cases in an air-conditioned environment the patients improve slowly, remain as they were on admission to the hospital, or, if anything, grow worse. In extrinsic cases the patient's realization that he can remain entirely symptom-free in the proper environment is a sharp stimulus to its reproduction in his home, so that some 15 per cent of the patients purchase air-conditioning equipment. A considerable number of patients who have had previous treatment and instruction in eliminating house dust are spurred to renewed effort in taking precautions, and as a result require little if any medication and no air-conditioning equipment.

Experimental work with air-conditioning apparatus, especially in pollen asthma, has been done for some years. This type of treatment is not within the scope of this paper, but is closely allied to the subject under discussion; the reader is referred to the work of Nelson,[3] Gay,[4] Criep,[5] Vaughan,[6] Cohen[7] and others.

In cases of proved intrinsic asthma, treatment should be directed toward the cause, be it infection, as by histamine-producing bacteria, autosensitization phenomena, as in lung damage, or a reflex effect, as in tissue abnormality. In all cases it is important to distinguish whenever possible between the primary causes of the disease and the secondary, contributing factors, such as emotion, fatigue, exhaustion, unusual exertion, psychologic strain, physiologic stresses during puberty or menstruation and endocrine disturbances, as at the menopause. The asthma which follows exposure to cold and is due to a temperature reflex or to physical allergy, as well as the attacks which are due to an "asthma habit," cannot be treated with any great success without making the cure more troublesome than the disease. Psychological causes are not very common, certainly not so common that we can blame them for our failures, but their possible presence should never be forgotten, although they may be difficult to discover when acting as secondary factors. As an example of this type of case, we had a patient with pollen asthma who stated that each injection of pollen caused a constitutional reaction the following night. Without her knowledge, normal saline was substituted for pollen extract. She stated that the constitutional reactions were worse than ever and requested adrenalin. Saline solution was substituted for adrenalin and gave immediate and complete relief. Fear of the pollen injections precipitated attacks of asthma, and faith in the efficacy of other injections relieved them, although both injections consisted of 5 minims of normal saline. Psychotherapy, particularly explanation and assurance, are as important parts of the treatment of asthma as they are of any chronic disease.

General treatment of the average extrinsic case may be tedious and sometimes complex, but is not difficult or impossible. The elimination of dust, feathers, orris root or any other causative inhalants should be thorough. The physician must train himself — and it is well worth the trouble — to avoid the usual pitfalls. It is not uncommon to have patients deny that there are any feathers in the home environment, when a visit turns attention to a stuffed bird, the presence of which everyone in the family had ignored. A symptom-producing allergen may come into the environment by the most devious channels.

We recently had a patient sensitive to chrysanthemums who had to give up playing tennis because tennis balls are dipped in a moth-killer containing pyrethrum, an allied protein. Last

year we examined a man sensitive to orris root who denied the use of cosmetics but whose difficulties coincided with the visits of his daughter, who operated a beauty parlor. One of our patients sensitive to wheat had a husband who was a baker and who brought home enough flour in his clothes to cause symptoms by wheat inhalation. With a patient whose attacks always occurred on the day she left home for a holiday her symptoms were due neither to fatigue nor to the strain of departure but to the karaya gum used in the setting lotion of the hair treatment she always had the day before she left. A mother brought in her child, who was highly sensitive to fish, stating that the child had had asthma all summer. It was discovered that the attacks followed swimming and wading in a fresh-water lake: well-stocked with fish, the water undoubtedly contained a minute amount of fish protein which was sufficient to cause difficulty. For a list of household objects causing sensitivity the papers of Cohen[7] and Feinberg[8] should be consulted. It is often necessary to emphasize that it is the spirit of the law that matters rather than the letter, as shown in the case of a nurse who thought she was obeying orders when using a wet mop, but handled it so as to flick dust into the air not picking it up with the mop.

When the environment cannot be controlled, additional treatment may be effected by injections of the offending inhalant, unless the patient is sensitive to cotton seed, to glue or to some other exceedingly dangerous protein. Autogenous extracts made from dust taken from the patient's home seem to be the most successful. When the symptoms are not relieved in this manner, symptomatic treatment by drugs may be necessary. The latter method differs in no way from that employed for intrinsic asthma, described below.

The general policy of treatment in intrinsic cases, whether the cause be infection or reflex action, is of course similar to that in any other chronic disease. It is inadvisable to extract teeth and remove tonsils on the mere suspicion that they may be causative factors. On the other hand, sources of the reflex irritation should be removed, and foci of infection when eliminated may prove to have been causative. The approach to operative procedures should err on the conservative side, but if sinus surgery is to be attempted it should be thorough.

The patient should always be told that the elimination of secondary factors means the removal of sources of aggravation which will enable the primary condition to be more easily borne. An occasional day in bed, a high-vitamin diet, a sun-ray lamp, all have their place in secondary general treatment, and for the patient who is co-operative and can afford them these measures will help make life bearable. In this category also are secondary factors such as extremes of temperature and certain types of exertion. The patient who knows that shoveling snow or smelling ammonia causes his asthma should avoid each as much as he can. A trip to Florida or to Arizona during the winter months, if possible, should be recommended, although it must be remembered that some patients, especially those who have a pollen sensitivity or are affected by physical factors, may be worse off for the change. Breathing exercises seem to help many patients, although the amount of good accomplished is difficult to ascertain.

Other secondary factors such as an overloaded stomach, with or without flatulence, or constipation may require treatment by a competent gastroenterologist. As in all other abnormal conditions, the patient must be regarded as a whole person, and all the lesions, however slight, as well as psychologic factors must be measured. To omit consideration of such apparently minor factors may mean missing the central pivot upon which the entire case balances. Such steps as the removal of diseased tonsils or the securing of a divorce have been followed by the disappearance of all asthmatic symptoms.

Extremely mild cases may be helped by simple expectorants such as a saturated solution of potassium iodide, or ammonium chloride given at four- to six-hour intervals. A slightly more severe case may require an antispasmodic, perhaps only at bedtime. It is well worth remembering that it is better to give ephedrine prophylactically at bedtime than to attempt to relieve an attack when it has taken a firm hold. If the attack is not relieved in thirty minutes the ephedrine is probably not being effective. The effect of ephedrine wears off in four to six hours, and when given at bedtime it rarely helps the patient whose attacks occur at four or five o'clock in the morning. Phenobarbital seems more effective in combination with ephedrine than is Amytal, although both are widely employed. It is perhaps not sufficiently realized that the barbiturates are smooth-muscle constrictors and may themselves cause asthma or exacerbation of such symptoms as are present. Chloral hydrate seems the best sedative, but for most patients with asthma of great degree the sleep it brings is unfortunately brief. Combined with Amytal it seems to work very well. Aspirin and Pyramidon and a number of other coal-tar products have been used, and still form a large proportion of the proprietary remedies, but in view of the prevalence of aspirin sensitivity and the depressing effect of Pyramidon on the bone marrow, their employment should be carefully supervised, or better still

avoided. Codeine is valuable for patients who cough a great deal and who are not sensitive to that drug. Hot milk at bedtime has long been recognized as an aid to the asthmatic patient, and for many, an ounce of whiskey is a real boon. If the latter does not put the patient to sleep it at least keeps him happy while awake.

For patients who require more intensive treatment, capsules containing ephedrine, a phenobarbital and aminophylline may be prescribed; the last-named drug, a potent vasodilator, seemingly acts synergistically with the other two. Tablets of this composition are available commercially as Tedral and Franol. When the medication is used during the daytime, 3 gr. of caffeine or a cup of hot coffee should be given as a respiratory stimulant. When the mixture is used at bedtime, however, the caffeine may keep the patient awake despite the phenobarbital. Aminophyllin may be given alone in doses up to 5 gr. It occasionally causes nausea, vomiting and a sense of fullness in the head. These secondary effects are, however, uncommon. In these cases also, especially when the attacks are periodic, it is better to give the capsules prophylactically, one every eight hours, than to attempt to treat a fully developed case after asthma has developed. Patients are much more co-operative when attacks can be prevented than when they can only be shortened. Combinations of the iodides with adrenalin and stramonium are commonly used, and prescriptions may be found in almost all textbooks.

In the patient whose symptoms come often and are troublesome, adrenalin may be necessary. This should be injected intramuscularly for such an injection seems to act more quickly and to last longer than one given subcutaneously. Most doses are too large. Few patients require more than 8 minims, repeated in ten minutes if a single injection is not effective. It should, of course, be stressed that the earlier in the attack the adrenalin is given the sooner the relief will begin and the longer it will last. Combinations of adrenalin with other drugs, such as pituitary extract, are efficacious only in regard to their content of adrenalin. Adrenalin in a 1:100 solution and applied with a nebulizer is widely employed, but the patient must be given specific instructions, since failures are more often due to ignorance as to the proper technic than to this particular method of administration. Slowly absorbed adrenalin[9] is not yet available commercially but is not difficult to make; it will sometimes give as much as twenty-four hours' relief, although the relief is often of short duration for the patient who normally requires adrenalin every four to six hours. It may have an unpleasant immediate effect.

Morphine should not be given, however much the physician may wish to use it. In occasional cases in small doses, for a patient who is under the direct supervision of a physician, it has its place, but in the ordinary case in ordinary doses its effect may be disastrous.[10] One hears of these cases post mortem, and it is frequently said that "the asthma was so severe that not even morphine could control it." It has been reported and is probably true that Pantopon acts only because it contains morphine and that untoward incidents are less common with Pantopon only because the so-called equivalent doses of the drug are slightly less. For patients with an idiosyncrasy to morphine Dionin may be used hypodermically, the average dose being ½ gr.

Cases requiring more treatment than that outlined above are approaching status asthmaticus, for which the treatment is much more intensive and so diverse that it cannot be described here.

Several other adjuncts of treatment should be mentioned. For the patient with a non-productive cough which is unaffected by ordinary expectorants, bronchoscopy and the removal of inspissated mucus may bring dramatic relief.[11] Some patients seem to be benefited by bronchoscopy and the injection of lipiodol, repeated at intervals of several months. Methods of nonspecific treatment are legion. None of them seem to work as well as they do in the hands of their original discoverers — those most skillful in their employment. Vaccine treatment may be tried, but here the pitfalls are so many that the treatment often fails even in the hands of those most experienced in its use. X-ray treatment and fever treatment either by the hypertherm or by protein shock have been reported as successful, and undoubtedly are so in rare cases, but they have not been generally accepted due to the fact that the more favorable published results have not been duplicated. It must be admitted, however, that in occasional cases the results are brilliant. One wonders, however, how much of the effect is due to psychotherapy.

The treatment of the patient with chronic bronchial asthma in order to be at all successful depends on a thorough understanding of the patient and of his disease, combined with a complete study of his complaint. These being supplied, treatment by scientific elimination of allergenic inhalants, foods or infections or by desensitization, giving symptomatic treatment if necessary, assures the patient a maximum amount of well-being. The condition, however, is a capricious one, and for every patient completely relieved by a simple antispasmodic mixture there is another in whom none of the drugs or treatment outlined above are of any help. Undoubtedly, however, most patients with

chronic bronchial asthma can be given help and their lives made bearable.

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PROGRESS IN NUTRITION

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HAPPINESS, HEALTH AND DIGESTION

IN THE national campaign for health conducted last year in England, Lord Horder (Brit. M. J. *2*: 858-859, 1937) gave the introductory address on "Health and Happiness." Some of the points discussed were these:

The Minister of Health is making an advance on different fronts, and with different sorts of armament. But the objective is the same. The crusade assumes two things — the will to be fit and a modicum of intelligence. If we sit sullenly at home when healthy recreation is offered out of doors and we are the sort to be benefited by it, we are performing an antisocial act; and if we take home a leaflet from the post office on the rearing of babies when we haven't any, we don't help ourselves to be fit — even though suggestion is sometimes a helpful form of treatment. Everybody must choose the method of achieving fitness which is most applicable to his needs, and if he does not know which is the most applicable he should ask the doctor. The doctor cannot supply the *will to be fit* . . . but he can supply the intelligence.

It is difficult to define fitness, yet we all recognize the fit man, woman and child when we see them. . . . The health services have been chiefly responsible for adding considerably to the expectation of life. The Minister of Health expressed this in a telling way . . . by saying that the length of life today is nineteen years longer than when he was born. But . . . this mere prolongation of life is not fitness. . . . Fitness is health plus happiness. . . . The man who says "Gosh! I'm fit this morning" is not expressing a satisfactory state of his muscle merely, nor even of his liver; he is expressing satisfaction with life. This is the sort of fitness we want. . . . The ingredients of optimum fitness are really very simple. . . . Enough of the right food; shelter, which includes clothes and warmth; a job of work; access to fresh air and such sun as our climate yields; leisure for play of body and mind — these are the essential things. . . .

It is not the business of the doctor to solve the economic problems of the nation, but it *is* our job to know about health. I take Mr. Chamberlain's statement . . . that he sees no chance of paying out money for . . . specific measures which might adjust the lag . . . between economics and national health. . . . The lag is most marked in the matter of food. Until the right kinds of food are made more readily accessible to the people, one of the main factors in the national fitness will not have been dealt with. . . . The medium through which the principles of nutrition operate is *food*. . . . Make the mixed diet accessible and nutrition will look after itself. Food first, and then some plain, homely instruction upon what to do with it, and how to cook it, and how not to waste it.

Health services have been so planned that the term "family doctor" has become in many parts of the country a farce. The doctor should be paid to keep the family fit, not paid at the rate of so much a year to attend the head of it when he is ill. The doctor then becomes the real link between the health services and the families for whom they exist. He can plead on their behalf; nay, if necessary, he can *demand* the services they especially require. And if it be advanced that the doctor's training has not up to now fitted him for work of this sort, then the sooner it does fit him the better. Inevitably the doctor's work in the future will be more and more educational, and less and less curative. More and more he will deal with physiology and psychology, and less and less with pathology. He will spend his time keeping the fit fit rather than trying to make the unfit fit. . . . This reorientation of his education and of his work is overdue, and will remain overdue until reorientation takes place in the attitude of health authorities toward him and his sphere of usefulness.

If the physician's sphere of usefulness in the future is "to make the fit fit," and one of the main factors in becoming fit is to make the right foods accessible to the people through principles of nutrition, he must learn and expound "the digestive qualifications of man." An article so entitled, by Wakefield and Mayo (Am. J. Digest. Dis. & Nutrition *4*: 287-291, 1937) discusses some pertinent points of digestion:

It is a fundamental endowment of the human species to eat a larger number and variety of foods than does any other mammal. Any food is normal for man as long as it does not contain large amounts of cellulose, chetin or similar materials. . . . Man is a facultative carnivore and herbivore. He possesses the common enzymes of both

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species, with increased storage capacity over the carnivora and decreased complexity of stomach and colon over the herbivora. . . . The digestive system of man as we know it is a fundamental endowment; it is one of the greatest attributes he possesses, and is to a large extent responsible for obtaining his so-called pre-eminence over all other living things. Criticisms of this remarkable system because man assumes the upright position are destructive, founded on false assumptions, and serve no purpose other than to create apprehension in the minds of those who are unable through lack of training or opportunity to make first-hand comparisons of the various digestive systems of mammals.

In considering diets and giving dietary instructions to patients, if occasion arises, it should be emphasized that man is superior to all other mammals in the number and variety of foods that he may eat and digest . . . and is limited only by his alimentary capacity. However, the possession of these superior qualifications does not warrant abuse. . . . Emphasis should always be placed on the fact that the upright position has given man no digestive handicaps. Supposed symptoms attributable to "stasis" and "angulation" of any part of the alimentary canal as a result of the upright position are spurious. In short, man is anatomically and physiologically superior in his digestive functions, the same as he is supposed to be in his intellectual attainments, over all living things.

FOOD AND HEALTH

Gregory (Nutrition Abstr. & Rev. *7:* 1-5, 1937) has made the following statements:

Fitness can never be obtained by physical measures alone, be they educational or recreative; adequate nourishment is an essential factor in its attainment. Malnutrition is the root cause, and increased attention to sports or physical training can never mitigate the ill effects of a bad diet. . . . The essential principles of nutrition established by research are that green vegetables and fruits are not luxuries but necessities, and that cereal foodstuffs must not so dominate a diet as to exclude an adequate supply of fresh animal products — milk, dairy products, eggs, fish and meat. . . . Foodstuffs are the material of which mankind is built, and they should not be considered as purely commercial products but as human necessities, the wise consumption of which will repay in health the money expended.

In a study by Cathcart and Murray (J. A. M. A. *108:* 1129, 1937) of the food consumed by the inhabitants of representative Scotch and English communities, the amount of protein, fat and carbohydrate was found to be relatively constant. The amount of food ingested was somewhat lower than that advocated; for of the 109 women students interviewed the daily diet averaged only 2035 calories. And while the diets for energy, protein, fat and mineral salts were satisfactory, their content of the protective foods, as milk, green vegetables and fruit, was inadequate. A report on the nutrition of the people of French Indo-China by a commission of the League of Nations (Geneva, March, 1937, Pp. 74-101) showed that the food was insufficient in quantity rather than quality. For the food of the agricultural laborer, who was a representative of the largest and poorest class, alternated in an amount necessary for mere sustenance or starvation. Rice was the staple food, maize was commonly used, and various dishes were made of the soya bean; but yams, sweet potatoes, native cucumbers, Chinese cabbage, sesame seeds and sugar cane were eaten by the better classes. Fish was commonly eaten and some use was made of pork, but well-balanced meals were consumed only by the affluent and by patients in hospitals. The protein requirements of man have been studied and presented by Leitch and Duckworth (Nutrition Abstr. & Rev. *7:* 257-267, 1937). Adults consuming an adequate mixed diet with sufficient animal and vegetable protein were found to need 50 gm. of protein a day, but those very active physically required a much larger amount, and such an increase was not considered at all injurious. Children from one to two years of age, however, needed from 35 to 50 gm. a day but as they became older more protein was necessary until they reached the age of seventeen, when 150 to 160 gm. a day was required.

Indigestion of some kind was found by Horsters (Med. Klin. *33:* 689-692, 1937) to occur in many of the working classes of Germany; among the 1179 men and women examined from the industrial area of Berlin, 1.6 per cent had gastritis, 5.2 per cent gastric ulcer, 1.8 per cent cancer of the stomach and 2.5 per cent other disorders of the stomach. Some of the causes of these gastric disturbances were thought to be due to the consumption of warmed-over food in which vitamins A and C had been destroyed or of too much highly spiced food, or to the excessive use of tobacco in the form of smoking or chewing. The effects on 12 healthy women of a "slimming diet" of a quart of milk and six bananas a day for a week have been reported by Sainsbury and Smith (J. Home Econ. *29:* 468-471, 1937). The food consumed varied from 600 to 1037 calories and the expenditure of work from 2243 to 3266 calories a day, the loss of nitrogen ranged from 0.9 to 3.0 gm. a day, and the loss of weight from 4 to 10 lb. a week. A reduction of the hemoglobin was found to occur, but both calcium and phosphorus were stored during the period. The diet was found satisfying but became distasteful after a few days, and it actually produced gastrointestinal disturbances in a few of the women. The development of peptic ulcers in East Indians has been shown by Orr (Adv. Bd. Indian Research Fund Asso., 1936, Pp. 54-66) to follow an excessive consumption of foods containing carbohydrate and a reduction of those containing protein, fat and vitamins. The beneficial effects of improved nutrition on rejected recruits for the English army have been recorded by Capon (J. Roy. Army M. Corps *68:* 293-304, 1937). They were

demonstrated by giving 33 men a daily diet of 4738 calories, which included 137 gm. of protein — half of animal origin — and 166 gm. of fat. As an adjunct to the diet the men were given special kinds of physical training. These measures were carried out for three months; they resulted in the attainment of the required standard by 21 men and its near-attainment by 6.

In "The Ritual of Purgation" a few pertinent facts are pointed out by Witts (Lancet *1:* 427-430, 1937), and illogical adherence to the general use of laxatives is condemned. In acute illness few symptoms are due to constipation, and purgation with its attendant dehydration has an unfavorable effect on the disease. Intestinal toxemia results in diarrhea rather than in constipation. Meteorism is not due to a slow passage of the intestinal contents but almost always to an acute infection of the bowel or to handling the intestine at operation. Purgatives should never be given to patients with Addison's disease or with thyrotoxicosis, and are dangerous in cases of measles, severe burns or edema. In alimentary hemorrhage and in peritonitis, inactivity of the bowel for a week or so is beneficial. Purgatives can be given to secure dehydration in acute infections of the alimentary tract, in increased intracranial pressure and in epilepsy, but in other acute disorders enemas should be resorted to. Dimock (*Brit. M. J. 1:* 906-909, 1937) has reported a method to treat constipation without laxatives. For this purpose bran has been made use of, and is given in doses of 1 to 5 tablespoons a day; when patients under treatment became regular in their bowel habits, the amount was reduced without a change in the periodicity of the stools. By this method 91 of 110 patients were successfully treated.

Clinical vitamin deficiencies have been ably recorded by Youmans (J. A. M. A. *108:* 15-20, 1937), and slight degrees of these disorders have been found important to treat in all kinds of patients. An early disorder due to lack of vitamin A is determined by a slight hemeralopia and from smears of the bulbar conjunctivae. B avitaminosis can be made out from an examination of the food consumed, as well from the therapeutic results of the administration of the pure vitamin. Slight degrees of scurvy may be detected from an examination of the urine, as well as from the response to large doses of the vitamin. A diagnosis of vitamin D deficiency is difficult, and a deficiency of vitamin E can be determined only by the symptoms of the disease and by a knowledge of the food consumed by the patient. The treatment of these disorders with satisfactory preparations of these vitamins was found to be almost invariably successful. Changes in the structure of the tissues as a result of vitamin deficiencies have been reviewed by Wolbach (J. A. M. A. *108:* 7-13, 1937). Food without vitamin A produces a keratinizing metaplasia of epithelial cells; that without vitamin B causes a degeneration of the cells of the myelin sheaths, but this is a secondary disorder and the primary lesion is not yet understood. The outstanding characteristic of vitamin C deficiency is the inability of the supporting tissues to produce and maintain intercellular substances; that of vitamin D deficiency is a failure in the calcification of bone matrix or osteoid tissues.

PREGNANCY AND THE NOURISHMENT OF CHILDREN

In a study of the course of pregnancy in adipose primiparas, Moller-Christensen (Ugesk. f. Laeger *99:* 965-970, 1937) found that the patient and the fetus were subject to more frequent and more serious complications, than was the case in women of normal weight. Prophylactic treatment for the reduction in weight of obese women before conception through dietary measures and physical exercises alone brought about the best results. Once they have become pregnant, however, the food allowed should not contain more than 2000 calories and should include adequate vitamins and minerals. By this regimen and exercise the patient's weight ought not to increase during the first trimester, and the increase ought not to exceed 2000 gm. per month during the remaining period of pregnancy. When the weight of the fetus reached 3000 gm. during the last two months, the induction of premature labor was advocated. In England, various aids to reduce maternal mortality in child-bearing women have been reported by Williams (Pub. Health *50:* 231-233, 1937). Medicinal aid was not found very effective when its results were compared with those in unassisted groups, but special supplements to the diet, which consisted either of essence of beef or of dried milk, Ovaltine and Marmite, brought a reduction in mortality from 6.39 to 1.64 per cent in treated women as compared with those in unassisted groups. A similar point of view has been taken by Biggar (J. Asso. Med. Women in India, Feb., 1937, pp. 22-26) as regards prevention of the anemia of pregnancy. To prevent it, a diet rich in iron-containing foods, such as meat, eggs and green vegetables, was advocated for all married women; but when this measure was impractical on economic grounds, instruction in the use of medicinal iron was given.

Several reports on the beneficial use of vitamin C during pregnancy have been published. In a study by Gaehtgens and Werner (Arch. f. Gynäk. *163:* 475-486, 1937), most of 26 pregnant women

were found to be suffering from a vitamin C deficiency. In one by Dicker (Schweiz. med. Wchnschr. *67:* 74, 1937), 5 pregnant patients with persistent vomiting were relieved by ten to fifteen daily injections of 0.1 to 0.2 gm. of ascorbic acid. In one by Widenbauer and Kühner (Ztschr. f. Vitaminforsch *6:* 50-75, 1937), the milk of 6 nursing mothers on an institutional diet was found to contain only 0.5 to 2.2 mg. per cent of ascorbic acid, but after the use of 300 mg. of the acid daily, the ascorbic-acid content rose to 3.8 to 7.8 mg. per cent. The ingestion of 80 to 100 mg. of the acid a day by nursing women was recommended in order to supply 40 to 50 mg. of this essential food to the infant. Through the recognition of the early symptoms and the use of a special test of the serum, in order to determine a rupture of the placenta, Shute (Am. J. Obst., & Gynec. *33:* 429-436, 1937) has successfully prevented abortion in some patients by the immediate administration of 30 to 50 cc. of wheat-germ oil. Similarly, the use of wheat-germ oil to prevent abortion in women who have had many miscarriages has become increasingly valuable. According to Currie (Brit. M. J. *2:* 1218, 1937), its use in 37 women, who had had collectively 130 pregnancies, had aborted more than once and had given birth to only 16 living infants, made possible the delivery of 37 full-term, normal children. In 14 women who had threatened abortions use of the oil prevented the disorder. By the use of a salt-free diet and the limitation of water to 1000 cc. a day, as reported by de Snoo (Am. J. Obst. & Gynec. *34:* 911-939, 1937), eclampsia in Holland has become generally controlled. In the application of these measures, when edema, hypertension or albuminuria occurs in pregnancy, the food and fluid of the patient are immediately restricted and the amount of sodium chloride in the urine is frequently determined in order to ascertain whether the diet is being followed.

In a report on the nutritive requirements of infants by an international commission (Bull. Health Organiz., League of Nations *6:* 291 and 293, 1937) the amount and kind of food are recorded. The number of calories needed is 110 per kilogram of body weight for the first three months, 100 for the second, and 90 for the third. The daily food at six months should contain 15 or 25 gm. of carbohydrate; a month later a few tablespoons of cooked vegetables, and at ten to eleven months eggs, vegetable and meat soups and even finely chopped meat may be given. The amount of protein advocated is 2 gm. per kilogram of body weight per day for nursing infants and 3 gm. for bottle-fed infants. Of the accessory foods, 5 mg. of ascorbic acid and 500 international units of vitamin D per day for infants at three months of age, and 10 mg. of iron salts per day for premature infants and twins are recommended. In a study of the food consumed by 1674 school children living in the hostels of southern India, Aykroyd and Krishnan (Indian J. M. Research *24:* 707-725, 1937) found that the diet had a fairly high vegetable-protein but a low animal-protein, fat, calcium and vitamin content. Milk was seldom available, and green vegetables and fruit were provided only in small quantities. Nevertheless the diets of the children of these institutions were superior to those of most other children, and were reflected in taller and heavier bodies. In spite of this fact, angular stomatitis, phyrnoderma and xerophthalmia were some of the deficiency diseases commonly found in these children. Infants suffering from diarrhea must be given sufficient food, according to a study of this disorder by Joppich (Med. Klin. *33:* 790-793, 1937), and even short periods of fasting are dangerous. A reduction of the milk to one half the normal amount or the substitution of buttermilk, supplemented with 2 to 4 per cent corn or maize starch and 5 per cent sugar, was found valuable.

OPHTHALMIA AND DISORDERS OF THE EYES

A test of vitamin A deficiency in English school children through the determination of dark adaptation, measured by the Hirschfeld photometer, has been applied by Maitra and Harris (Lancet *2:* 1009-1014, 1937). The results of the test in an East London school showed that 36 per cent of the children were definitely subnormal, whereas 22 per cent of the council children of East London and 31 per cent of the council children of Cambridge were abnormal. Fifteen drops of halibut-liver oil per day was given to 40 of the deficient children; when tested again four weeks later only 1 child failed to show improvement. In order to determine the occurrence of vitamin A deficiency in adults, Jeghers (J. A. M. A. *109:* 756-762, 1937) examined 162 medical students by means of the dark-adaptation test, and found that 35 per cent gave low photometer readings. Twelve per cent were found to have avitaminosis A, 27 had night blindness, 15 had photophobia, and 2 had follicular keratitis. Infections were more frequent and severer in the students with vitamin A deficiency. An analysis of their eating habits showed that irregular meals and the consumption of unsuitable food were responsible for their deficiency. An improvement in the diets so as to supply liberal amounts of the accessory food factors and the administration of 4000 international units of vitamin A per day relieved the deficiency and subsequently aided in maintaining health.

Ocular lesions associated with nutritional deficiencies have been pointed out by Wagener and Weir

(Am. J. Ophth. *20:* 253-259, 1937). Hemeralopia and xerophthalmia in patients from vitamin A deficiency have become well established, but it is probable that an insufficient amount of several vitamins is responsible for some of the other ocular lesions. Malnutrition of this kind may be due to a failure of absorption from the digestive tract, to persistent and prolonged vomiting or to an increased utilization of vitamins during a period of rapid growth or a severe disease. Optic neuritis, hemorrhages into the retina, paralysis of the ocular muscles and perhaps nystagmus are due to this kind of malnutrition. Ezickson and Feldman (J. A. M. A. *109:* 1706-1710, 1937) correlated the signs of vitamin A deficiency in the eye with the occurrence of stones in the kidney in 25 patients; 24 were found to have subnormal dark adaptation. Most of the patients were given from 13,000 to 52,000 international units of vitamin A concentrate per day for six to nine months, and were then re-examined; while only 1 showed improved dark adaptation, all appeared healthier and in none was there formation of new stones.

BERIBERI, PELLAGRA AND DISORDERS OF THE NERVES

Several epidemics of beriberi have been observed in the negro troops of the French colonies by Malard and Delprat (Rev. serv. de san. mil. *106:* 91-114, 1937); the recognition of the disease in its early stage and prompt treatment invariably brought about relief. Some of the initial symptoms were edema over the tibial surfaces, a diminution of the patella reflex response and cardiac weakness with tachycardia. The disease was considered to be due to the consumption of too much rice and to fatigue, and was relieved by the reduction of this food and by rest. The nature of cardiovascular disturbances in patients with beriberi has been described by Weiss and Wilkins (Ann. Int. Med. *11:* 104-148, 1937). The disturbances were extremely variable, but tachycardia, symptoms of congestion and abnormal electrocardiograms were among the most pronounced signs. Treatment with vitamin B_1 concentrates or vitamin B_1 hydrochloride generally brought about relief of the cardiovascular disorders before those of the nervous system. Yeast in daily doses of 120 to 250 Sherman units has been found more effective in the treatment of beriberi than is tikitiki, according to the studies of Vitug and Austria (J. Philippine Islands M. A. *16:* 731-737, 1936). With the former treatment, most patients showed an improvement in their symptoms in from four to seven days, as well as relief of the cardiac signs, subcutaneous edema and muscular tenderness.

An excellent clinical and biochemical study of pellagra in 26 African children has been made by Trowell (Arch. Dis. Childhood *12:* 193-212, 1937). The disease was characterized by multiple lesions of the skin, especially hyperkeratosis, rashes, ulcers at the corners of the mouth, nostrils and eyes and fissures along the flexor surfaces; there were also changes in the hair and nails, edema and gastrointestinal disturbances, but little disturbance of the nervous system. In these pellagrins, both the microcytic and macrocytic forms of anemia were found, the blood-sugar curves were flattened, and large amounts of fat were discovered in the feces. Treatment in a hospital with a diet including liver, eggs, milk and oranges, together with a vitamin B_2 concentrate, cod-liver oil and large doses of iron and calcium lactate, brought recovery in about a month. The incidence of pellagra in some of the Southern states during recent years has been shown by DeKleine (Am. J. Pub. Health *27:* 595-599, 1937) to be more often associated with agricultural than with economic depressions; for during periods when vegetable seeds and fresh yeast were distributed to the poor classes there was a marked decrease in the incidence of the disease. Buitelaar (Geneesk. tijdschr. v. Nederl.-Indië *77:* 1351-1359, 1937) has recorded the development of pellagra in 2 patients in an institution where the food was adequate and complete. The disease was ascribed to attacks of dysentery and a failure of absorption. Having studied 250 white and 190 negro pellagra patients during a period of fifteen years, Sydenstricker and Armstrong (Arch. Int. Med., *59:* 883-891, 1937) recorded a mortality of 23 per cent in the former and 36 per cent in the latter. Among associated diseases, psychoses were found in about half the patients, glossitis, stomatitis and dermatitis in most, diarrhea in two thirds and alcoholism in only a third. In a few postmortem examinations lesions thought to be due to the gastrointestinal disturbances were found in the liver.

Severe epidemic pellagra and alcoholic pellagra resulting from dietary deficiency alone have been shown by Spies et al. (J. A. M. A. *108:* 853-857, 1937) to be identical diseases. In the treatment of 50 patients a high-calorie and high-protein diet was supplemented by 180 to 270 gm. of dry brewer's yeast per day; this resulted in the complete recovery of 47, while in the 3 that died the lesions had improved. The use of nicotinic acid in the treatment of pellagra has been described by Smith et al. (J. A. M. A. *109:* 2054-2055, 1937) and by Fouts et al. (Proc. Soc. Exper. Biol. & Med., *37:* 405-407, 1937). In 1 case subcutaneous and intramuscular administration of 60 mg. of the acid per day brought a dramatic improvement within twenty-four hours. In 4 other patients who took 0.5 to 1 gm. of the acid per day by mouth the

general condition improved in two days, the lesions of the mouth healed in five days, and the dermatitis disappeared in from six to twenty-five days. In order to prove the beneficial effects of liver in the treatment of pellagra, Ruffin and Smith (South. M. J., *30:* 4-14, 1937) gave 107 hospital patients with this disease a pellagra-producing diet, consisting of large amounts of maize and other cereals, syrup, lard and salt pork, which also contained various antipellagra preparations. Thirty of the patients were relieved but most of the others became worse or had relapses. The latter were next given various kinds of liver extract orally and parenterally, and most of them recovered. The most effective agent was an alcoholic extract combined with the residue from this extraction which was given parenterally. Similarly, Petri et al. (Hospitalstid. *80:* 841-848, 1937) have used Ventriculin alone or with pepsin and dilute hydrochloric acid with success.

About 200 patients in a West African hospital who had retrobulbar neuritis, optic atrophy and lesions of the skin were observed by Moore (Lancet *1:* 1225-1227, 1937); all responded to treatment by some kind of yeast. The disorder was thought to be due to a vitamin B_2 deficiency and might have been prevented by proper protein in the food. The treatment of 30 epileptic children with a ketogenetic diet, according to Wilkins (J. Pediat. *10:* 341-357, 1937), has not been found especially valuable. Of this number 8 were freed of attacks, 4 were temporarily relieved and later had relapses, 3 had no attacks for a short period, and 15 were not benefited. A limitation of carbohydrates in the diet of patients with migraine was found useful by Porges (Med. Klin. *33:* 664-665, 1937). Some patients who improved had already tried a salt-free diet without benefit, but a combination of a restriction of salt and of carbohydrates proved the most valuable.

SCURVY, ASCORBIC ACID AND SKIN DISEASES

Estimates of the ascorbic-acid content of the serum of a few patients with a mild form of scurvy made by Lund et al. (Klin. Wchnschr. *16:* 748-750, 1937) were very low, as much as 4 mg. of the acid per kilogram of body weight per day for three weeks was required to bring about relief. Some cases of asymptomatic scurvy have been reported by Ingalls and Warren (New Eng. J. Med. *217:* 443-446, 1937); 8 of the 20 patients studied had had gastrointestinal hemorrhages, and all but 2 had serum values for ascorbic acid of 0 to 0.6 mg. per cent. The food had contained an inadequate amount of vitamin C for long periods. Göthlin et al. (Acta med. Scandinav. *92:* 1-38, 1937) estimated the minimum amount of ascorbic acid required per day for adults as from 20 to 24 mg. per kilogram for one of fifty, 23 to 27 for one of sixty, 27 to 34 for one of seventy, 31 to 38 for one of eighty and 35 to 43 for one of ninety.

Testing for the vitamin C content of the urine has been simplified by Harris and Abbasy (Lancet *2:* 1429, 1937). By their method a patient urinates at 9 a. m. and the specimen is discarded; he passes urine again at noon and the specimen is titrated. The same procedure is carried out on the second and occasionally the third day. For several days following the last titration, a dose of 70 mg. of cevitamic acid per kilogram of body weight is given, and the urine is collected in the afternoon and tested. The amount of vitamin C found in the urine in the first test represents about one eighth of the total excretion at the resting level; that found in the second test is indicative of the patient's tendency to become saturated. From observations on healthy European and Bantu subjects in reference to the retention of vitamin C, Bernstein and Weiner (South African J. M. Sc., *2:* 37-43, 1937) found that a test dose of ascorbic acid was almost always immediately excreted by the former but not by the latter. The retention by the Bantus was thought to be due to insufficient vitamin C in the diet as compared with that of the Europeans. The absorption of vitamin C in patients with achlorhydria, according to the report of Einhauser (Arch. f. Verdauungskr. *62:* 1-13, 1937), was greatly reduced. Saturation was more readily brought about by drinking orange or lemon juice than by the consumption of the pure vitamin, but the parenteral use of ascorbic acid was found effective.

In a study of 200 infants and young children suffering from eczema, Goodman and Burr (Arch. Pediat. *54:* 30-33, 88-96, and 153-159, 1937) found that the disease originated when supplementary feedings were started. The use of a balanced diet to maintain growth and to increase resistance to infection was especially advocated and if this method could not be carried out on the basis of lists of prescribed foods given to the parents, more exact information was obtained from records of the food actually consumed. In improving the nourishment and health of eczematous children, the omission of sugar from the food, the adoption of regular intervals for feeding and the ingestion of nothing but boiled water between meals proved beneficial. In a somewhat similar study, Hill (New Eng. J. Med. *217:* 690-693, 1937) reported that eczema in infants was usually of the atopic dermatitis type and that attention to the diet was of the greatest importance. In mild cases the substitution of evaporated cow's or goat's milk for ordinary milk was the only measure required; but

in severe cases the use of synthetic milk-free food, oatmeal or cornmeal, carrots, string beans, bananas, crystalline vitamin C, fish oil and reduced iron were necessary to relieve the patient. On the other hand, Finkelstein (Am. J. Dis. Child. *54:* 344-353, 1937) has recommended the use of skimmed milk or buttermilk with the addition of vitamin B_2 for the treatment of eczema in infants, and the omission of butter and other fat foods to relieve older children with seborrheic eczema. A diet composed of a small amount of milk, some vegetables and fruit but little carbohydrate has proved valuable in the treatment of eczema of the true type in these young patients. Vegetables, milk and a salt-free diet have been found valuable by Stein (Wien. klin. Wchnschr. *50:* 259-264, 1937) in patients with acute dermatoses of the ear, but correction of a gastrointestinal disorder was found necessary in the treatment of those with a chronic disease of the skin of the ear.

RICKETS, DENTAL DECAY AND ARTHRITIS

In a comparative study of the value of viosterol, cod-liver oil and percomorph liver oil in preventing rickets, Lewis (J. Pediat. *10:* 155-166, 1937) divided 487 infants into eight groups and gave them much the same food, but different kinds of antirachitic oil during the winter months. Three groups received 135 U.S.P. units of viosterol, another three groups received 435 U.S.P. units of cod-liver oil, one group received 870 U.S.P. units of percomorph liver oil, and a final group not given any kind of supplementary food served as a control. Roentgenograms of the bones of three-fourths of the infants were made during the spring, and 1 infant in each of the groups taking oil except that receiving percomorph liver oil had rickets, while 13 of the 21 infants in the untreated group showed evidence of the disease. On this account, the three oils were considered as of equal potency in the prevention of the disease. Continued exposure to sunshine from March to November, as reported by de Rudder (München. med. Wchnschr. *84:* 1841-1843, 1937), was considered the most valuable measure in the prevention of rickets. During the other months vitamin D_2 in large amounts was given, and on account of the purity of the preparations it was not found toxic. Opitz (Deutsche med. Wchnschr. *63:* 1213-1215, 1937) observed that a single injection of 15 mg. of pure vitamin D_2 in oil cured rickets in infants. From a study of 62 patients, after such an injection the symptoms of spasmophilia disappeared in two days, the blood phosphorus began to rise in four days, and the deposition of calcium in the bones was apparent from roentgenograms in eight days. The use of vitamin D_3 in the treatment of 18 infants with florid rickets was found by Folberth (Ztschr. f. Kinderh. *59:* 329-337, 1937) to be the most effective form of treatment. Four drops of the preparation in a 0.03-per cent solution in oil was given twice daily by mouth to most patients in the beginning of treatment, but later this dose was increased to 8 drops for some patients. The results of treatment in 16 patients showed an average healing period of thirty-three days for 14 of them; 1 was not benefited, and 1 died.

An attempt has been made by Schotz (Hospitalstid. *80:* 57-83, 1937) to find an explanation for the development of teeth free from decay. In an examination of the teeth of 25,000 children in Oslo, Norway, those of only 160 were found to be sound; most of the latter children belonged to the highest social classes. In the children of a day nursery an average of 14.6 cavities was found in each, but in those from private homes the average was only 0.74. The latter children drank whole milk generously and ate whole-meal bread, raw vegetables and fruit, and spent five or six hours a day out of doors. Some used toothbrushes while others did not; some had a liberal allowance of sweet stuff while others had none; and some took cod-liver oil regularly while others took none. The conclusions reached was that dental caries resulted from the omission of necessary elements from the diet rather than from those elements actually included. In a study of 100 children with caries, Kugelmass (New York State J. Med. *37:* 1733-1742, 1937) observed that when dietary deviations from the normal in carbohydrates, in acid-base ratio of ash, in calcium and in vitamins A and B were corrected in the food, dental decay in the children was arrested in three months in 65 per cent of the cases. Korkhaus (Deutsche med. Wchnschr. *63:* 1861-1864, 1937) discovered that the substitution of hard, stale whole-meal bread for soft, fresh bread in the diet of 143 orphanage inmates not only reduced the incidence of caries but improved the development of the teeth and jaws, since the children were compelled to masticate their food properly. Barnes (Brit. Dent. J. *63:* 86-91, 1937) made a re-examination of the teeth of 183 inhabitants of the Tristan da Cunha islands, in the South Atlantic, after a period of five years, and encountered a somewhat higher percentage of dental caries. The increase was thought to be due to a more liberal consumption of sweet foods and refined flour than was being taken at the time of the first examination. Of men recently recruited for the army in Germany 17 per cent were rejected; of this group 15 per cent according to Wegner (Deutsche med. Wchnschr. *63:* 138-140, 1937) failed to meet the required physical standard because of carious

teeth. In Germany since the World War the consumption of bread has decreased 30 per cent; but from the bread consumed by the soldiers of Germany and Italy only 20 per cent of the bran was removed, while from that eaten by the soldiers of England, France and the United States 30 per cent was removed. An increase in the allowance of whole-meal bread, the giving of more food containing the vitamins and minerals, and a diet that required thorough mastication were advocated for the use of soldiers in Germany.

In observing 12 patients with chronic rheumatic conditions, Hare (Proc. Roy. Soc. Med. *30:* 1-10, 1936) found that the ingestion of raw vegetables, nuts and fruit was beneficial. The results of treatment were better in cases of atopic arthritis than in cases of hypertrophic arthritis. Massive doses of vitamin D were given to arthritic patients by Steck (Illinois M. J. *71:* 243-248, 1937) with beneficial results. A dose of 15,000 international units of vitamin D per day was given at the beginning of treatment, and this amount was increased every two weeks by 30,000 units until 300,000 units were being given. If a patient showed clinical improvement, a recalcification of bone from roentgenograms or an increased corpuscle count or sedimentation rate, the dose was reduced to 180,000 units per day. The diet was also improved by an allowance of 25 to 30 calories and 1 gm. of protein per kilogram of body weight, and by the restriction of high-carbohydrate food so that the diet contained more minerals and vitamins.

GOITER, KIDNEY DISORDERS AND CANCER

The value of iodized salt for popular consumption in the prevention of goiter has been proved by the events that occurred in Houghton County in Michigan, as reported by Kimball (J. A. M. A. *108:* 860-864, 1937). In this county during the Depression non-iodized salt was bought by many families; comparative surveys made of the school children of this period and of those of more prosperous times when iodized salt was used demonstrated a marked increase in the incidence of goiter from the consumption of non-iodized salt. An official report of a commission appointed in Michigan for the study of the value of iodized salt for preventing goiter was made by Cowie et al. (J. Mich. State Med. Soc. *36:* 647-655, 1937). During ten years 30,448 children were examined. Of this number, 20,785 had used iodized salt and 4.71 per cent of them had the disease, while of 5622 who used the salt at times the percentage was 15.25 and of 4041 who had never used the preparation it was 17.5 per cent. But when these figures were compared with those made ten years previously and before iodized salt was generally consumed, the incidence of goiter showed a reduction of from 74 to 90 per cent. A similar result has occurred in Switzerland, as reported by Wagner-Jauregg (Wien. klin. Wchnschr. *50:* 797-799, 1937). Here in 1923 the incidence of goiter in school boys was 62 per cent and in school girls 67 per cent, whereas in 1936 and after the general use of iodized salt during the intervening period, the incidence in the boys was reduced to 36 per cent and in the girls to 41 per cent. Equally important, the use of the salt brought a marked diminution of the incidence of goiter in young children, as well as a marked reduction in the severity of the disease.

Favorable results achieved in cases of acute nephritis through a diet of uncooked vegetables have been reported by Faltitschek (Ztschr. f. klin. Med. *131:* 583-598, 1937). Water was restricted for a few days preceding the use of the diet, and animal protein and sodium chloride were added with caution during convalescence. The ingestion of large amounts of vegetable protein proved harmless. In patients with chronic nephritis the diet mentioned was likewise found beneficial; the result was explained by a reduction of the proportion of sodium in the food through an increase of potassium. The occurrence of renal calculi and their relation to the consumption of food in South African Negroes have been studied and recorded by Vermooten (J. A. M. A. *109:* 857-859, 1937). A comparison was made of the records of 126,000 white and 91,000 negro patients admitted to the Johannesburg General Hospital between 1922 and 1935; 273 white but only 4 negro patients had renal or ureteral calculi. One of the latter patients was part Indian, 2 were half-castes, and only 1 was a full-blooded Negro. The food of the Negroes consisted of cooked cornmeal with a little milk and sugar, meat, yellow pumpkin and edible plants, and as it had a low calcium content, an acid ash and high values of vitamin A, it tended to prevent the formation of renal stones. As a result of having reduced the recurrence of renal stones from 16 to 5 per cent in his patients, Higgins (New York State J. Med. *36:* 1620-1628, 1936) strongly advocated a special diet in postoperative treatment. With the exception of vitamin A which was given in liberal amounts, the food prescribed was dependent on the reaction of the patient's urine; when it was acid, food with an alkaline ash was given, but when it was alkaline, the consumption of acid foods was recommended. Two tablespoons of cod-liver oil, or a corresponding amount of haliver oil or carotene in oil, to supply sufficient vitamin A, was advised daily.

An attempt to prevent the progress of cancer in patients by dietary treatment has been carried

out by Freund (Report of Second International Congress. Science and Social Campaign against Cancer. Brussels, 1936. P. 407). The purpose of the diet was to reduce acid fermentation in the intestine and to obtain normal cytolysis; it included an increase of protein and a decrease of carbohydrates and fats, especially oils containing palmitin. Good results were reported in incipient cases, and the diet was advocated in postoperative treatment. In a study of the vitamin deficiencies of patients with cancer, Schneider (Arch. f. klin. Chir. *190:* 397-413, 1937) found that in those with the disease in an early stage the carotene and vitamin A content of the serum was but slightly reduced, but in those in an advanced stage there was a marked reduction of serum values and vitamin A was excreted in the urine. After the administration of large doses of vitamin C, an increase in the excretion of this vitamin in the urine did not occur. In a book entitled *Cancer and Diet* (Baltimore: Williams & Wilkins Co., 1937), Hoffman stated that essential errors in the modern ways of eating were responsible for far-reaching changes in the functions and metabolism of the body. These errors extended over many years and were among the predisposing causes of malignant tumors. To carry out this point of view in practice, cancer might be prevented if physicians were able to see their patients while they were still well, and thus attempt to supervise and control their health. The book is divided into five parts, covering theories on the causes of cancer, modern diet, the metabolism of cancer, dietary facts about patients with cancer and general conclusions concerning malignant disease.

205 Beacon Street.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 24401

PRESENTATION OF CASE

A sixty-four-year-old, white, Canadian lawyer entered the hospital with the complaint of recurrent attacks of pain in the left arm, neck and precordium.

His health had always been excellent up to two and a half years before entry when, during a period of much financial distress and worry, he began to have attacks of pain which originated in the left arm near the shoulder and radiated to the neck, sternum and precordium. He described the pain as a sense of compression or constriction and said that it often felt as if an augur were boring through his chest. The attacks were precipitated by exertion or emotional upsets and first occurred two or three times a week, lasting four to six minutes. They were relieved by nitroglycerin and similar drugs. During the two years before entry the frequency of the attacks increased to four or five times a day, and his activities were greatly curtailed. About six weeks before entry he had his first attack at night, and after that nocturnal attacks became frequent. He spent the three weeks before entry in an outside hospital, where the attacks increased in frequency up to a maximum of twenty times a day, most of them occurring at night. However, during the two days before entry to this hospital, he had no attacks. He had had no dyspnea, orthopnea, paroxysmal nocturnal dyspnea, syncope or peripheral edema. On occasions he had been awakened by palpitation, which was a forceful, rapid beating of his heart without noticeable irregularities.

His past and family histories were noncontributory.

Physical examination revealed a well-developed, somewhat obese man lying semi-recumbent in bed, in no distress. His heart was not enlarged; the sounds were of fair quality. There were no thrills or murmurs. The blood pressure was 140 systolic, 100 diastolic. The lungs and abdomen were negative. The vessels of the extremities were slightly thickened and tortuous. There was no peripheral edema.

The temperature was 98.6°F., the pulse 80. The respirations were 20.

The urine examination was negative. An electrocardiogram showed slight left-axis deviation, inverted T_1 and T_4, and small R_4.

On the second hospital day left paravertebral alcohol injections were done from the first to the fourth thoracic vertebra. After the needles were inserted, 2.5 cc. of novocain-adrenalin solution was injected through each; this produced a left Horner's sign and dryness and warmth of the left arm. Then 3 cc. more of novocain, followed by 5 cc. of 95 per cent alcohol, was injected through each needle. During the procedure the patient made no complaint of pain. Shortly afterward it was noticed that he was somewhat less alert mentally and that his speech was slurred. His pulse fell slowly from 120 to 60, and his blood pressure dropped to 40 systolic, 30 diastolic. His extremities became cold and cyanotic. During the next two hours his condition remained about the same and it gradually became more difficult to arouse him. He developed Cheyne-Stokes respirations, and at times his pulse and blood pressure faded out completely. He was given 7½ gr. of caffeine subcutaneously and a total of 7 cc. of Coramine intravenously. He was also put in an atmosphere of 25 per cent carbon dioxide and 75 per cent oxygen. None of these procedures were of any apparent benefit. At the end of the two hours he suddenly vomited and stopped breathing. He was rolled over on his face, his nose was aspirated, and carbon dioxide and oxygen were injected into his nasopharynx. For almost a full minute he did not breathe, but suddenly he gave a few gasping respirations and his radial pulse became easily perceptible. In the next few minutes his respirations became regular, and his blood pressure rose to 86 systolic, 60 diastolic. After half an hour his blood pressure was 90 systolic, 60 diastolic; his pulse rate was 80, and his respirations normal.

The following morning his condition was fairly good, although on two occasions he vomited small amounts of material; his speech was still somewhat slurred, and his blood pressure was 100 systolic, 70 diastolic. On the third day his condition was about the same, but there were questionable signs of pneumonia at the right lung base; his temperature was normal, but his white-cell count was 24,600. An electrocardiogram showed that T_1 and T_2 had become diphasic, and T_4 upright. The lung fields were clear by x-ray. The following day his pulse rate was 120. Signs of sympathetic nerve block in the expected areas were obvious, and he had no cardiac pain. He failed somewhat during the night and on the next day was restless and worried and showed definite Cheyne-Stokes breathing. His blood pressure varied between 95 systolic, 85 diastolic and 112 sys-

tolic, 95 diastolic, and his temperature rose to 101°F. An electrocardiogram showed inverted T_1, and diphasic T_2, T_3 and T_4. The white-cell count was 20,200, and the urine contained a trace of albumin.

During the next eight days he gradually ran a downhill course. His pulse remained elevated; there was considerable variation in blood pressure; Cheyne-Stokes breathing was marked, so that it was necessary to keep him in an oxygen tent. In the last three days his temperature rose to 103°F., and he developed definite signs of paresis in the left arm and leg. He never showed signs of pulmonary consolidation and never had a pericardial friction rub or complained of pain. He died on the fourteenth day. The electrocardiogram on the ninth day showed depressed ST_1, elevated ST_2, inverted T_1, T_2 and T_4 and notched P_2, P_3, P_4, R_1, R_2, R_3 and R_4. On the eleventh day it showed a lower voltage and slurring of the QRS complexes, inverted T_1, sagging ST_2, diphasic T_3, late inverted T_4 and broad, notched P waves. On the day of death, three days later, the voltage had increased, the T waves were less deeply inverted than before, and the P waves had changed in contour.

Differential Diagnosis

Dr. Robert S. Palmer: This is a perfectly typical story of angina of effort developing into angina decubitus of a very severe degree. A not uncommon finding even in advanced coronary disease is a negative physical examination. Probably one of the occasions when the electrocardiogram is really very important is in such a case as this. The electrocardiographic changes are consistent with coronary disease except that the T waves in Lead 1, as I see it here, have a depressed ST interval. This is more like the change due to digitalis. There is a depressed ST_2, and an inverted T wave. I should say that the width of the QRS complex is at the upper limit of normal. I do not know on what date this tracing was taken, but if it is according to the new technic for Lead 4, the T wave is upright as it should be. T_4 has a slightly high origin. Variations in the origin of the T waves above and below the isoelectric line are sometimes more important than other findings. The initial deflection in Lead 4 (also if by the new technic) is upright but small; this also is characteristic of coronary disease and suggests a coronary thrombosis in the past. I should conclude that the electrocardiogram is consistent with coronary disease and that coronary occlusion in the past is possible in spite of the lack of a definite history. On the other hand, it may be that we are dealing with a slowly progressive coronary closure during days or weeks before death.

When a man with severe coronary disease is having anginal attacks up to twenty times a day, including angina at rest, it is obvious that every resource must be used for relief. I think whoever was managing him was justified in suggesting an operative procedure. Paravertebral alcohol block was done in this case to interrupt the pathway of pain; it is only in this type of case that the operation is justified, for it has its risks and the patient with coronary disease is a poor subject for operation. The pathway was interrupted, and it appears that the observers thought the patient experienced sudden respiratory failure. None of the procedures they employed were of benefit. Following alcohol injections for angina pectoris there are certain complications to be anticipated. One of these is pneumothorax. In this case there are no physical signs to suggest this and subsequent x-ray examination of the chest rules it out. Another complication is bronchopneumonia, which I do not think we have to consider in this case. A third is coronary thrombosis. We must remember that an acute coronary occlusion may occur any time in patients with angina pectoris.

The patient then developed paresis of the left arm and leg. This is certainly evidence of a cerebral accident. The cerebral accident was not due to embolism from a venous thrombosis because the procedure is not of the sort to produce venous thrombosis. Furthermore, a diagnosis of cerebral embolism of peripheral origin would involve the assumption of paradoxical embolism through a septal defect of the heart. The patient had a fall in blood pressure and a slow pulse and was in a condition resembling shock. He may well have had a coronary thrombosis, the pain being absent because of the alcohol injections. If he had a coronary thrombosis, an explanation of the cerebral attack could be on the basis of mural thrombus. I do not know how early a mural thrombus can occur in coronary thrombosis. I know that I have seen symptoms due to emboli as early as two or three days after the original attack. There is no reason why a mural thrombus could not have formed in this brief time and hence have been the origin for his cerebral accident. On the other hand, embolism usually occurs after the initial period of shock and after some recovery of heart function with better muscle contraction. To me, embolism as soon as this seems unlikely. The other possibility is that with a fall of blood pressure associated with a coronary thrombosis the patient, whom we assume had cerebral as well as coronary arteriosclerosis, had a cerebral thrombosis. I have never had an opportunity to follow

closely a patient with a cerebral thrombosis; that is, being there before, during and after the attack; but those who have had this opportunity report a slow pulse. A slow pulse is very common when the patient is observed after the attack. Cerebral thrombosis occurs most often at times of relative inactivity, commonly during the night at a time when the blood pressure is relatively low. A coronary thrombosis in this case, by causing a fall in blood pressure, would create conditions favorable to a cerebral thrombosis.

In acute coronary occlusion after an alcohol injection, pain of course will not be present since the pathway of pain has been interrupted. Of the greatest importance, therefore, is to observe the change which has taken place in the electrocardiogram. He still had an inverted T_1 and what looks like a slightly depressed ST. There may be somewhat more slurring of the QRS, and it is interesting that the T wave is slightly changed. There is a distinct depression of ST and a diphasic T, showing definite change from the previous electrocardiogram. The left-axis deviation is more marked. There is a definite change in T_4. It is not always easy to make a definite statement from electrocardiographic examination alone, and sometimes a series of tracings should be done. This man had a fairly persistent, very low blood pressure. With a cerebral accident alone, while the blood pressure is low, it is never, in my experience, so low as this. The white-cell count was 24,000. In the absence of signs of pneumonia, I believe that this is consistent with an infarct in the heart. If he had an infarct it must have been a large one. The average white-cell count in cardiac infarction is 12,000 or 15,000. When it is 20,000 or more, a large infarct is anticipated and the temperature is expected to be higher than usual.

We do not know the details of the neurological examination. We assume that he continued to have a somewhat slurred speech without any particular localizing signs. I believe that such a condition is consistent with the so-called "central cerebral syndrome" due to thrombosis, embolism or hemorrhage and is related to involvement of the anterior cerebral artery. The process was evidently progressive. The development of a definite paresis of the left arm and leg should be consistent with an extending thrombosis of a fresh process. He might have had an additional embolus or he might have had an extension of a thrombosis, which is not unusual, involving the middle cerebral region.

This last electrocardiogram does not look much like the other. There are inverted T waves and definite slurring of QRS complexes suggesting early intraventricular block. So far as the electrocardiogram goes, I think it has amply demonstrated that after the attack following operation there has been a definite change in the ST intervals, in the duration of the QRS and also in the voltage, which has become lower. I should say that we have electrocardiographic evidence that he had an additional coronary thrombosis. The pain was prevented by the alcohol injection. Other observations, namely the very high white count and the fever, are likewise consistent with this diagnosis. The clinical course following operation indicates a cerebral accident, so that we are led to make two diagnoses. One way in which they could be connected would be to postulate an embolus from a mural thrombus, but it would have to have formed almost simultaneously with the infarction. A more likely possibility would be to assume that the patient had coronary thrombosis and developed shock, which is characteristic, and that a cerebral thrombus developed coincident with the fall in blood pressure. Whether the second episode, — the paresis of the left arm and leg, — which was not particularly sudden, was due to extension of a cerebral thrombus or to an embolus from a mural thrombus I do not know, but I prefer to believe that it was due to the former.

The only other thought I have in this connection is whether it is wise or necessary to add adrenalin to the novocain used for local anesthesia in a person with marked coronary disease, inasmuch as we know that adrenalin predisposes to attacks of angina and possibly to coronary thrombosis. When dental extractions are contemplated in the presence of known coronary sclerosis, cardiologists sometimes suggest that novocain without adrenalin be used. Whether this point is important, I do not know, but it is worth considering.

DR. JAMES C. WHITE: The first part of this history does not bring out very clearly the fact that when the patient was at the hospital he had definite periods of aphasia, so that it was obvious that he had advanced arteriosclerosis of his cerebral as well as of his coronary arteries.

I did the usual paravertebral alcohol injection of his cardiac nerves, which went perfectly smoothly, but he was an apprehensive individual and worried about the operation, although it did not hurt him. On completing the injection I noticed that he was less alert, and within a few moments he appeared to be becoming comatose and to be showing respiratory distress. This progressed by alarming degrees; he stopped breathing and I could obtain neither blood pressure nor heart sounds. He was rolled over on his face and given artificial respiration and an injection of Coramine. Much to our surprise his pulse suddenly returned, and with it, spontaneous respiration. His systolic blood pressure returned to 80. My idea at the moment

was that he had had an acute cerebral vascular accident, but with the persistently low blood pressure, weak heart sounds and leukocytosis it soon became apparent that he had a severe coronary infarction, which failed to produce any pain because his cardiac nerves were blocked. When one does this type of surgery on patients with advanced coronary disease, one is always playing with fire. We have seen two other patients who would probably have died in the same way, except that they developed their fatal coronary occlusion the night before the injection was scheduled. One other patient died in this way fifteen hours after injection, and also without any pain because the cardiac nerves were completely blocked. I think perhaps that we have been lucky heretofore in having only two deaths in a series of fifty-five patients injected for intractable cardiac pain.

Dr. Palmer's point about using adrenalin is interesting. I have used adrenalin, knowing the dangers of it, but in small amounts; I have done it because I wanted the effect of the novocain to last. If you do not add adrenalin to the novocain, anesthesia does not last over half an hour and there is a good deal more pain as a result of the alcohol injection. With adrenalin the effect of the novocain is prolonged two hours and the painful reaction of the alcohol is practically gone by the time the novocain is absorbed from the tissues.

Clinical Diagnoses

Arteriosclerotic heart disease with angina pectoris.
Coronary and probable cerebral infarction.
Terminal bronchopneumonia.

Dr. Palmer's Diagnoses

Arteriosclerotic (coronary) heart disease.
Angina pectoris.
Coronary thrombosis, recent and (?) old.
Cerebral thrombosis.

Anatomical Diagnoses

Atherosclerosis, marked; coronary, aortic and cerebral.
Coronary occlusion.
Infarct of heart, healing.
Pulmonary infarction, bilateral.
Prostatic hyperplasia.
Operative wound: alcohol injection, left thoracic nerve roots, with hemorrhagic radiculitis.

Pathological Discussion

Dr. Tracy B. Mallory: The autopsy showed very severe coronary disease. The descending branch of the left coronary artery was entirely obliterated with a very old organized thrombus. The right coronary artery narrowed down to pinpoint size at a point 2.5 cm. from the mouth, and the circumflex branch of the left was also narrowed to perhaps half the normal diameter. We did not find any fresh thrombi in any of the major coronary vessels. There was a large area of infarction in the heart and it was covered with a thrombus which was only in part organized. I thought it would be interesting to submit this to my brother, Dr. G. Kenneth Mallory, who has recently been studying the process of repair in cardiac infarction. He has developed criteria for estimating the age of cardiac infarcts, on a histological basis, which appear to be fairly accurate. Without knowledge of the patient's history he estimated this to be one of about five or six weeks' duration. There was no evidence of any more recent process. Certainly, then, the infarct developed several weeks before the alcohol injection, probably at the time of onset of the severe nocturnal attacks.

The probable basis for the sudden development of a shock-like state became apparent when we examined the lungs. Although no major pulmonary emboli were present many small ones were found, which had produced six sizable infarcts in the left lung and one large one in the middle lobe of the right lung. All these appeared to be of about equal duration; they were sharply demarcated, indicating that they had been present a number of days, but they were still very red and the air was not wholly resorbed, which would place their duration somewhat under two weeks. The clinical picture was certainly not typical of pulmonary embolism, but our experiences in these clinics have served again and again to show the protean character of its symptomatology.

The brain was carefully examined. It showed two small areas of infarction, one in the right lenticular nucleus and another in the right internal capsule. They account well enough for the hemiplegia but do not seem impressive enough to explain the profound and prolonged shock. Nothing was found in the medulla which might account for the respiratory difficulties. All the cerebral arteries were markedly sclerotic and significantly narrowed, but there was no occlusion of any of the major ones.

Dr. Palmer: Would you say that the cerebral infarcts were due to embolism or to thrombosis?

Dr. Mallory: Dr. Kubik and I have repeatedly tried to make that distinction, usually with no success. An embolus quickly becomes adherent and, unless it is very recent, becomes indistin-

guishable from a thrombus. In this case I am somewhat prejudiced in favor of thrombosis, but I cannot prove it.

CASE 24402

Presentation of Case

A fifty-five-year-old American female factory worker was admitted complaining of jaundice.

For as long as she could remember the patient had suffered from occasional attacks of nausea occurring at three- and four-month intervals. These attacks lasted for several hours and were usually accompanied by vomiting and occasionally by a sensation of pressure beneath the right shoulder blade. At less frequent intervals there was sharp epigastric pain, sufficiently severe to cause her to double up. These attacks were not associated with nausea. For about twelve years there was infrequent regurgitation of small amounts of food after meals, generally after fatty foods. During the six years preceding entry she frequently felt bloated and suffered from gaseous eructations. In general, however, her health was fairly good until seven months prior to entry. At this time, following malaise and right upper-quadrant soreness of two weeks' duration, she developed severe jaundice for the first time. Following the appearance of the jaundice she became troubled with daily nausea and vomiting. At this time her doctor examined her blood and found a red-cell count of 4,700,000 and a white-cell count of 6200. The stools became clay colored during the first week of her jaundice but thereafter were normal in appearance. There was no fever or other significant symptom, and after five or six weeks the jaundice subsided. Two months later, however, after a head cold and cough of two weeks' duration she again developed jaundice accompanied by a pressing, aching pain in the epigastrium, which radiated to the right upper quadrant just below the costal margin. The pain was intermittent, occasionally sharp, but never actually colicky in nature. After ten days it subsided completely. During this period her stools were again clay colored for a few days, her urine was extremely dark, and there was severe pruritus. A month before entry she was admitted to another hospital where she remained for two weeks. Her jaundice, although still present, was not marked; it varied considerably in intensity but was constantly evident. A high-carbohydrate diet was prescribed. The blood showed a red-cell count of 3,200,000, with a hemoglobin of 65 per cent; the white-cell count was 5400. A plain x-ray film of the upper abdomen showed the spleen to be slightly enlarged. In the right upper quadrant there was a faint shadow suggestive of a thick-walled gall bladder. There were no opaque calculi. A gall-bladder series showed no concentration of the dye. Following a heavy meal she suffered a brief attack of moderately severe pain high in the epigastrium, radiating to the right upper quadrant and to the right back. On the following day the jaundice deepened, and after another day the stools became clay colored. During this episode, which lasted for four days, her temperature ranged between 100 and 103°F. Subsequently the symptoms subsided. Following discharge she had no further nausea or vomiting, and her appetite was "fair." For two weeks preceding entry to this hospital she had frequent night sweats. Her weight had diminished from 156 to 122 lb. during the year prior to admission.

Physical examination showed a well-developed, jaundiced woman who exhibited evidence of chronic illness and weight loss. The skin was dry, icteric and rather deeply pigmented. There were many rounded, maculopapular, brownish lesions scattered all over the skin, most prominent on the extremities and particularly on the anterior aspect of the right leg. The tongue was heavily coated. The lungs were clear, and the heart normal. The blood pressure was 125 systolic, 72 diastolic. The liver edge extended 3 cm. beneath the costal margin and was firm, smooth and nontender. The tip of the spleen was felt just beneath the costal margin. There was resistance, but no true spasm, in the entire upper abdominal wall. No note was made of tenderness. The remainder of the examination was negative.

The temperature, pulse and respirations were normal.

Examination of the urine showed a specific gravity of 1.020, with a slight trace of albumin. The sediment of an uncatheterized specimen showed 40 to 50 white blood cells per high-power field. The blood showed a red-cell count of 4,000,000, with a hemoglobin of 75 per cent. The white-cell count was 5700, with 57 per cent polymorphonuclears. Reticulocytes varied between 1 and 2 per cent. A stool examination and a Hinton test on the blood were negative. The nonprotein nitrogen of the blood was 17 mg. per cent, and the serum protein 5.8 gm. A van den Bergh showed 3 mg. per cent of bilirubin. A fragility test showed beginning hemolysis of the patient's red cells in 0.5 per cent saline solution and complete hemolysis at 0.3 per cent. A normal control showed beginning hemolysis at 0.44 per cent and complete hemolysis at 0.32 per cent. One Takata-Ara test was reported as doubtful, and another was negative. A liver-function test showed 50 per cent retention of the dye at the end of an hour. The fasting blood

sugar was 87 mg. per cent, and a sugar-tolerance test showed 132 mg. per cent of glucose at the end of thirty minutes, 126 mg. in an hour, and 108 mg. in three hours.

An x-ray film of the chest was negative. A Graham test showed a fairly large gall bladder, which was only faintly filled with dye. No stones were seen. The gall bladder did not change in size appreciably after a fatty meal, and its filling was definitely abnormal. A plain film of the abdomen showed a large amount of dye in the colon. The kidneys were normal in size and shape, and no unusual areas of calcification were seen.

The patient's general condition remained unchanged, and on the fourteenth hospital day a laparotomy was performed.

Differential Diagnosis

Dr. Robert R. Linton: This patient presents a prolonged history of gastrointestinal disturbances, which at first were not severe enough for her to seek medical attention. The attacks of nausea and vomiting, epigastric pain and pressure beneath the right shoulder blade, which antedate her present illness, suggest gall-bladder disease more than any other abdominal condition.

Seven months prior to her admission to the hospital, the history says she was jaundiced for the first time. Her stools became clay colored, and she was troubled with nausea and vomiting. The jaundice cleared up in five or six weeks, and the stools became colored at the end of a week. This points to an intermittent obstruction of the common bile duct. Jaundice disappears very slowly after such an obstruction is relieved; the stools, on the other hand, regain their normal color very soon. This explains why this patient's first attack of jaundice lasted five or six weeks and her stools were clay colored for only one week.

The second attack of jaundice occurred two months later. This followed a head cold, and the sequence suggests the possibility of an infectious hepatitis, but the attack was also associated with intermittent right upper-quadrant pain, clay-colored stools and very dark-colored urine.

She was admitted to another hospital one month before her entry to this one. Studies there showed that she had a secondary anemia and a slight leukopenia. X-ray films of the gall-bladder region showed a shadow suggestive of gall bladder, but there was no filling of the gall bladder with the Graham test. While in the hospital she had another attack of right upper-quadrant pain, which radiated to her right back. Again her stools became clay colored, and for the first time it was noted that her temperature ranged between 100 and 103°F. The night sweats that are mentioned were undoubtedly associated with the fever. It is of interest also that she had lost 34 lb. during the year prior to admission.

Physical examination showed an emaciated and jaundiced woman. Examination was not remarkable except that the liver was felt 3 cm. below the costal margin; it was firm, smooth and nontender. The tip of the spleen was also palpated. Laboratory studies at this time still showed a slight secondary anemia and leukopenia. The blood chemistry was essentially normal except for an elevated van den Bergh of 3 mg. per cent. The fragility test was essentially normal, and the reticulocytes were only slightly increased. These two normal findings quite definitely rule out the diagnosis of hemolytic jaundice. A Takata-Ara test was done but was not significant. The 50 per cent dye retention in the liver is of significance as it indicates liver damage. A repeated Graham test showed a large gall bladder which only slightly concentrated the dye. No change in size was noted after taking a fatty meal.

In reviewing this case, the history, as I have already stated, points to liver disease, most likely in the biliary tract. Because of the recurring attacks of right upper-quadrant pain associated with jaundice and clay-colored stools one is practically forced to make the diagnosis of cholelithiasis, with stones in the common duct. Additional evidence for this diagnosis is the fact that at one time she ran an intermittent fever, with the temperature as high as 103°F. Such a fever in the presence of common-duct obstruction indicates infection of the biliary tract. The fact that the jaundice was intermittent in character, as evidenced by the transitory periods of clay-colored stools, practically rules out cancer as the cause of the obstruction. Carcinomas of the common bile duct or the head of the pancreas, which are the commonest carcinomatous lesions producing obstructive jaundice, almost without exception produce an increasing type of jaundice rather than an intermittent one, as this patient had.

There is one other diagnosis that should be considered in this case — biliary cirrhosis. It is possible to get intermittent attacks of pain and jaundice in cirrhosis of this type. It is unusual, however, to get a history of clay-colored stools. The enlarged, firm, smooth liver and the slightly enlarged spleen certainly are consistent with this diagnosis.

I think it most likely that this patient was suffering from chronic cholecystitis, obstructive jaundice due to stones in the common duct and an associated biliary cirrhosis.

Preoperative Diagnoses

Cholelithiasis.
Hemolytic jaundice?

Dr. Linton's Diagnoses

Chronic cholecystitis.
Cholelithiasis.
Choledocholithiasis.
Biliary cirrhosis of the liver.

Anatomical Diagnoses

Cholelithiasis.
Choledocholithiasis.
Adenocarcinoma of the gall bladder.
Chronic cholecystitis.
Hydrohepatosis.
Intrahepatic cholangitis, acute and chronic.

Pathological Discussion

Dr. Tracy B. Mallory: As Dr. Linton has made perfectly clear in his discussion, the diagnosis of stone in the common duct was virtually unescapable in this case. Diagnostic interest in such a patient usually centers about the complications of biliary-tract disease of many years' standing. The most important of these are usually the secondary effects on the liver, but there are complications of significant frequency which pertain to the extrahepatic biliary tree, especially to the gall bladder itself. Enteric fistulas and carcinoma of the gall bladder are the two most important of these. Any patient with cholelithiasis for fifteen or twenty years is a good candidate for cancer of the gall bladder.

This patient was explored by Dr. George A. Leland, who found a chronically inflamed gall bladder, with a diffusely thickened wall, which contained a myriad of stones. These were mostly small; many of them, in fact, were hardly larger than grains of sand. The common duct was greatly dilated and also contained a large number of stones and a great deal of sand and mud-like deposits. All the stones appeared to consist primarily of bile pigment. One stone about 2 cm. in diameter was found in the common duct. Dilators were introduced into the duct and were passed through the papilla into the duodenum; it was then washed out with salt solution and eventually drained with a rubber tube. The gall bladder was removed. The liver showed no obvious gross evidence of cirrhosis, but many dilated bile ducts could be seen just beneath the capsule in the region adjacent to the gall bladder. A biopsy was taken from this area. When the gall bladder was examined in the laboratory it was noted that the thickening of the wall was not entirely uniform and that one spot about 2 cm. in diameter seemed a little firmer than the rest and showed an overlying ulceration of the mucosa. The lesion was not definitely recognized as carcinoma, however, until the microscopic sections came through. These showed a well-differentiated adenocarcinoma, very limited in extent but invading fairly deeply into the gall-bladder wall. So far as could be made out, there was no extension into the liver, but the lymphatic connections between the gall bladder and the liver are so numerous that it is highly probable an extension had already occurred in spite of the small size of the lesion.

As regards the liver itself, prolonged common-duct obstruction may make itself felt in a variety of ways. Sometimes the chief effect is a dilatation of the major bile ducts, a condition to which Counseller and McIndoe* gave the name of hydrohepatosis. On other occasions comparatively little dilatation of the larger ducts occurs, but marked proliferation of the smaller ducts is seen, sometimes accompanied by dilatation of the bile capillaries themselves with an alteration in the character of the hepatic cells, such that they become almost indistinguishable from bile-duct cells. Along with such changes, fibrosis almost invariably occurs and a well-marked cirrhosis of the biliary type is produced. Finally, secondary infection almost always occurs to a greater or less degree and serves to complicate the picture further. In this particular patient the changes were largely limited to the major ducts, and a definite hydrohepatosis had developed. This was complicated by a fairly severe acute and chronic intrahepatic cholangitis. There was comparatively little reaction in the smaller ducts, and only a minimal degree of cirrhosis.

One question we must leave unanswered. Did this patient have an underlying hemolytic jaundice? The enormous number of stones chiefly consisting of bile pigment is somewhat in favor of such a hypothesis but is insufficient to prove it. As Dr. Linton pointed out, the results of the fragility test were within normal limits. Furthermore, Dr. Leland at the time of operation felt that the spleen was not significantly enlarged.

*Counseller, V. S., and McIndoe, A. H.: Dilatation of the bile ducts (hydrohepatosis). Surg., Gynec. & Obst. 43:729-740, 1926.

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WHAT ASSISTANTS TO THE PHYSICIAN SHOULD BE LICENSED?

There has been a tendency, increasing in recent years, to require licensing, and thus control by the State, of more and more groups of persons. The unrelying idea has to do primarily with protection for the public. For example, if one drives an automobile badly one endangers the public and one's activity along that line should be suppressed. All drivers are therefore licensed. So too, the work of the plumber, the steamfitter, or the electrician is controlled by licensure, inasmuch as it involves a social responsibility and since a poorly performed piece of work may prepare the ground for a catastrophe involving loss of considerable property and many lives.

Despite its equally obvious social significance there has been the greatest hesitation in requiring licensure in connection with the healing art. There commonly exists the highly individualistic point of view that if a man is sick, or lives, or dies, he does so unto himself alone; how he chooses to be treated, if he is ill, is no one's business but his own. If he elects to die of smallpox, for example, who shall him nay! To be sure, the rights of other persons to be protected against smallpox have generally received consideration, but no guiding principle has been widely accepted in cases other than those of communicable disease. Yet there is growing gradually in the theory and practice of government an idea — by no means new — that a part of its function is to protect a man not merely against his aggressive neighbors, but against himself, that is, so far as possible, against his own stupidity, ignorance and wilfulness. The government has said for many years, not that a sick man shall have a doctor, but that if he has a doctor, the doctor shall fulfill certain minimum requirements before he is allowed to undertake the treatment of disease.

This is sound doctrine, but how far may it be applied? In its application, do logic and practicality agree? The physician, the intern and the medical student are licensed. So is the pharmacist on whom the physician once so obviously depended and without whom the practice of medicine cannot get along except as a cripple. The registered or licensed nurse is a valuable and valued assistant to the physician, and since there is a growing conviction that only persons showing certain qualifications should be allowed to nurse the sick, it seems likely that the licensing of all nurses and nursing attendants will eventually be required in Massachusetts. In some states this is already done. The licensing of all who employ physiotherapy has been required by some states. Finally, when the patient dies we require the licensing of the embalmer.

How far shall the movement to license all workers who in some sense assist the physician be allowed to progress? If some assistants need license, why not all? Should all opticians be licensed as well as all laboratory technicians and all makers of implements and instruments? Is it possible to

find a guiding principle in accordance with which the need for licensure can be determined? Are there any practical considerations which throw light on this problem?

It has been suggested that a guiding principle can be found in the relation between the service performed and the person who is treated. If the service concerns the body of the patient, such as the fitting of glasses or of a brace, the use of any of the modalities of physiotherapy, nursing care or the routine work of the technician in the laboratory, license should be required. All these manipulations or procedures require the direction or authorization of the physician, — if not his supervision, — and the protection of the public requires that those persons who assist the physician shall be qualified and worthy of the confidence that both physician and patient must place in them.

It is probable that some time will elapse before the medical profession realizes its responsibilities in this matter, and before it is willing to ask the legislature to give it groups of assistants on whom it may come to depend with a greater sense of security.

STILL THE GREAT WHITE PLAGUE

THE undesirability of having pulmonary tuberculosis seems hardly to need proof; certainly, a generation or two ago one would scarcely have considered this a point worth raising. However, as any disease gradually comes under control, as its morbidity decreases and its fatality rate recedes, there is danger that we may view it too complacently, thinking of it in relative terms compared with its previous importance.

We are accustomed to consider measles to be a relatively innocuous disease, and experience a rude awakening when a patient dies of it. The general mildness of scarlet fever in recent years has lulled us into a sense of security regarding its invasions, which may, during any season's epidemic, prove false.

In a general sense we know, without analyzing any figures, that fewer persons than formerly have tuberculosis; that of those who have it, fewer are likely to meet with an untimely death on its account. There is a psychologic hazard involved, and we cannot afford to adopt an attitude that might lead us to look with contempt on what is still the "great white plague."

A study of mortality among individuals with active pulmonary tuberculosis has recently been made for the Milbank Memorial Fund by Jean Downes and published in the quarterly journal* of that organization. The data presented in this study include essentially all the active cases of the adult pulmonary form of tuberculosis reported or discovered in the County of Cattaraugus, New York, during the twelve-year period, 1923-1935.

As a result of this study it is apparent that more than five times the number of deaths that might be expected of normal individuals occur among individuals with active minimal tuberculosis; that ten times the expected number occur among those with moderately advanced tuberculosis; and that approximately fifty times the expected number occur among those in an advanced stage of the disease. Moreover, 4 or 5 per cent of the reasonably satisfactorily arrested cases suffer a breakdown each year.

A report in the same number of the quarterly by Bailey B. Burritt on social and economic problems in the control of tuberculosis indicates that lack of adequate attention to the personality of the patient and to the social and economic needs of his family often nullifies and puts to waste the efforts of clinics and sanatoriums in his behalf. It is suggested that special consideration for tuberculosis cases could and should be secured from relief authorities and that further amendment of the Social Security Act, adding tuberculous families to those eligible for relief with federal aid, should be made.

*Milbank Memorial Fund Quarterly. July, 1938.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

SPONTANEOUS RUPTURE OF THE UTERUS DURING LABOR

Mrs. D., a twenty-eight-year-old gravida III, was seen in consultation on September 18, 1934, in active labor. Labor had started eighteen hours previously, and the membranes had ruptured spontaneously eight hours later. For the previous two hours the pains had been very strong, coming every two or three minutes without bringing the head into the pelvis, and for the previous half hour there had been a continuous flow of a small amount of bright-red blood.

The family history was unimportant. The patient herself had had the usual childhood diseases, and pneumonia in 1929. Her two previous pregnancies had been normal in every way. Her periods began at twelve, were regular with a twenty-eight-day cycle, and lasted four days. Her last period began December 6, 1933, making her expected date of confinement September 12. This pregnancy had been normal in every way up to the time of labor.

On physical examination the patient was thin but fairly well developed. Her heart was not enlarged; there were no murmurs. Her lungs were clear and resonant; there were no rales. The pulse rate was 118, the temperature 98.4°F., and the blood pressure 118 systolic, 88 diastolic. The fundus was felt two fingers below the ensiform, with a very large head palpable above the symphysis. The fetal skull could be palpated all too plainly through the thin abdominal wall. The fetal heart was present. The patient was in active labor, and with each contraction her physician had been administering small amounts of ether for the previous thirty or forty minutes. On vaginal examination a rupture of the uterus could be felt in the anterior wall 5 or 8 cm. above the cervical os. The latter was fully dilated and a large hydrocephalic head could be felt above the pelvic inlet. There was a steady issue of bright-red blood. The patient was catheterized and immediately prepared for laparotomy. A blood-matching test showed her husband to be compatible, and she was given 600 cc. of citrated blood before operation.

Under ether anesthesia a suprapubic incision disclosed a rupture of the anterior uterine wall just above the bladder reflexion, with a wedge-shaped hydrocephalic skull protruding through the rupture. A moderate amount of free blood was present in the peritoneal cavity. The incision was enlarged, and the fetus extracted. It was born alive but died a few minutes later. The placenta was implanted on the anterior wall near the site of the uterine rupture. A supravaginal hysterectomy was then performed, the peritoneal cavity carefully sponged out, and the incision closed in layers without drainage.

Pathological examination of the uterus showed evidence of hemorrhagic infiltration of the myometrium, most marked near the site of rupture. The pathologist believed this indicated weakening of the myometrium from premature separation of the placenta. The overdistention of the lower uterine segment by the hydrocephalic head's exerting pressure over a period of several hours resulted in spontaneous rupture of the uterine wall.

The patient made an excellent recovery and left the hospital on the thirteenth day.

Comment. Palpation of the abdomen, which revealed a large head above the inlet, made the diagnosis of hydrocephalus perfectly evident. Rupture of the uterus was not suspected until the vaginal examination was made, because the patient's general condition was not consistent with the collapse that so frequently accompanies rupture. The diagnosis, when made, demanded laparotomy. Had no rupture occurred, this hydrocephalic child could have been delivered from below, best with a destructive operation, since the cervix was fully dilated when the patient was seen.

It is worthwhile in passing to point out the value of x-ray in diagnosing hydrocephalus. This diagnosis should have been made before the patient went in labor, and had it been made, proper treatment during labor would undoubtedly have prevented the rupture.

A series of selected case histories by members of the section will be published weekly.

Comments and questions by subscribers are solicited and will be discussed by members of the section.

DEATH

SHEA — FRANCIS X. SHEA, M.D., of 36 Reed Avenue, Everett, died October 2. He was in his forty-fifth year.

A native of Everett he had lived there his entire life. He graduated from Holy Cross College in 1917 and received his degree from the Harvard Medical School in 1921.

Dr. Shea was a member of the Massachusetts Medical Society and of the American Medical Association.

His brother and two sisters survive him.

MISCELLANY

MAINE NEWS

Kennebec County Medical Association

The first fall meeting of the Kennebec County Medical Association was held in Waterville on September 15. The program was as follows: "Tuberculosis of the Bone," Dr. John G. Towne; "Ruptured Appendix," Dr. Harvey J. Bourassa; "Stricture of Urethra," Dr. Charles E. Towne; "Three Cases of Cancer of the Cervix Treated with Radiation," Dr. Ovide Pomerleau and Dr. Moses Lubell; "Spinal Meningitis Treated with Sulfanilamide," Dr. Ovide Pomerleau; "Chronic Glomerular Nephritis," Dr. T. E. Hardy; "Nasal Plastics," Dr. E. R. Irgens. After the dinner which was served at the Elmwood Hotel at 6:30 p. m., Dr. Howard M. Clute, of Boston, spoke on "Diagnosis and Management of Acute Inflammations of the Gall Bladder."

Togus Veterans' Administration

The Veterans' Administration of Togus, Maine, held a meeting on Thursday, September 15. The program was as follows: "Report of the Annual Meeting of the American Urological Association," Dr. F. T. Williams; "Hemorrhagic Peptic Ulcer," Dr. H. T. Perkins; "Progressive Muscular Atrophy," Dr. J. S. Walsh; "Case of Detachment of the Retina with Successful Operative Results," Dr. H. A. Goalwin.

Note

A consultation and diagnostic clinic of the Crippled Children's Program was held at the Thayer Hospital, in Waterville, on Wednesday, September 28. Dr. E. M. Tower was in charge.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR AUGUST, 1938

DISEASES	AUG. 1938	AUG. 1937	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	4	146	159
Chickenpox	99	105	106
Diphtheria	8	17	34
Dog bite	1154	1068	980
Dysentery, bacillary	22	20	34
German measles	34	26	40
Gonorrhea	433	490	588
Lobar pneumonia	139	120	111
Measles	261	108	161
Meningococcus meningitis	4	11	6
Mumps	143	95	152
Paratyphoid B fever	10	35	8
Scarlet fever	120	111	178
Syphilis	422	528	434
Tuberculosis, pulmonary	323	289	318
Tuberculosis, other forms	37	36	36
Typhoid fever	11	11	18
Undulant fever	5	3	4
Whooping cough	399	688	559

*Based on figures for preceding five years.

RARE DISEASES

Anterior poliomyelitis was reported from: Haverhill, 1; Holyoke, 1; Northampton, 1; Shelburne, 1; total, 4.

Diphtheria was reported from: Boston, 1; Franklin, 1; Gloucester, 1; Somerset, 1; Taunton, 3; Wellesley, 1; total, 8.

Dysentery, bacillary, was reported from: Boston, 5; Lowell, 11; Salem, 3; Wareham, 3; total, 22.

Malaria was reported from: Framingham, 1; Haverhill, 1; total, 2.

Meningococcus meningitis was reported from: Ipswich, 1; Taunton, 2; Worcester, 1; total, 4.

Paratyphoid B fever was reported from: Abington, 1; Boston, 7; Quincy, 1; Westfield, 1; total, 10.

Pellagra was reported from: Boston, 1; Cambridge, 1; total, 2.

Septic sore throat was reported from: Boston, 2; Everett, 1; Lawrence, 4; Lowell, 1; Somerville, 1; total, 9.

Tetanus was reported from: Boston, 1; Walpole, 1; Westford, 1; total, 3.

Trachoma was reported from: Arlington, 1; Boston, 1; Malden, 1; total, 3.

Trichinosis was reported from: Newton, 1.

Typhoid fever was reported from: Boston, 2; Brookline, 2; Chelsea, 1; Fall River, 2; New Bedford, 2; Somerville, 1; Woburn, 1; total, 11.

Undulant fever was reported from: Amesbury, 1; Norwood, 1; Wakefield, 1; Watertown, 1; Worcester, 1; total, 5.

Diphtheria was reported at a record low figure for the fourth consecutive month.

Measles, pulmonary tuberculosis, lobar pneumonia and tuberculosis (other forms) were reported above the five-year average.

Anterior poliomyelitis showed record low incidence.

Chickenpox, German measles, mumps, scarlet fever, whooping cough and meningococcus meningitis were reported below the five-year average.

The incidence of undulant fever was not remarkable.

Except for 1937, which was equaled, typhoid fever continued to show record low incidence for the fourth consecutive month.

The reported incidence of dog bite showed record high figures. Animal rabies showed record low incidence.

CORRESPONDENCE

HOSPITAL FACTS

To the Editor: Your editorial, "Facts or Opinions," in the September 15 issue calls attention to the contrast between the hospital figures used by the federal government's Technical Committee on Medical Care and the American Medical Association's Council on Medical Education and Hospitals. The council's recently published report stated that there are only thirteen counties in the United States no part of which is within 30 miles of a hospital and that there is only 1.5 per cent of the population living more than 30 miles from a hospital.

I have had occasion to examine carefully the reports of both the committee and the council. In the hospital maps drawn by the council for every one of the states, it appears that not only are the hospitals on the registered list of the American Medical Association used, but also over 2200 "unclassified" hospitals are included. The reason for putting these "unclassified" institutions on the maps and using them as a basis for certain statements and percentages is not clear, since the council's publications on hospitals have previously made a point of not using any statistics concerning the "unclassified" institutions, and no information concerning them appears in the annual hospital directory of the American Medical Association.

The committee's report and conclusions are based on general hospitals on the registered list only. The committee did not utilize an arbitrary 30-mile limit.

After reading your editorial, it seems to me appropriate to send the preceding statement of fact. Further comment on the two studies or discussion of the basis for deter-

mining hospital need in a state or a local area would require a much longer communication.

MICHAEL M. DAVIS.

Committee on Research in Medical Economics, Inc.,
9 Rockefeller Plaza,
New York City.

NOTICES

NEW ENGLAND DERMATOLOGICAL SOCIETY

Because of the holiday the next regular meeting of the New England Dermatological Society will be held at the Massachusetts General Hospital on Wednesday, October 19, at 3:00 p. m., one week later than scheduled. The clinic and discussion will be followed by a dinner at the Hotel Kenmore.

After dinner, Dr. Charles J. White will talk on "The Clinical Aspects of Fungous Diseases of the Skin." A general discussion will follow.

FREDERICK S. BURNS, M.D., *President,*
BERNARD APPEL, M.D., *Secretary.*

SOUTH END MEDICAL CLUB

The opening meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, October 18, at 12 o'clock noon.

Dr. Frank A. Pemberton will speak on "Cancer in the Female Pelvic Organs."

Physicians are cordially invited to attend.

JOHN B. HALL, M.D., *Secretary.*

TUMOR CLINIC, BOSTON DISPENSARY

Each Tuesday and Friday morning from ten to twelve-thirty there is a meeting of the Tumor Clinic of the Boston Dispensary, a unit of the New England Medical Center. All kinds of tumors are seen, discussed, and when indicated, treated with radium and high-voltage x-ray.

Physicians are welcome to visit this clinic and bring patients for diagnosis.

FAULKNER HOSPITAL CLINICOPATHOLOGICAL CONFERENCES

Through a typographical error in the *Journal,* issue of September 29, the Faulkner Hospital notice read: The clinicopathological conferences at the Faulkner Hospital during the coming year will be held, as usual, at five o'clock on the first *Tuesday* afternoon of each month. It should have read: The clinicopathological conferences at the Faulkner Hospital during the coming year will be held, as usual, at five o'clock on the first *Thursday* afternoon of each month.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, OCTOBER 10

TUESDAY, OCTOBER 11

*9-10 a. m. Boston Dispensary. Presentation of Dermatological Cases. Dr. F. M. Thurmon.

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

WEDNESDAY, OCTOBER 12

*12 m. Clinicopathological conference. Children's Hospital amphitheater.

THURSDAY, OCTOBER 13

*9-10 a. m. Boston Dispensary. Blood Clinic. Dr. I. Olef and Dr. H. G. Brugsch.

*10:30 a. m. Psychiatric Rounds. Boston City Hospital. Rounds will start at Room 916 on the ninth floor of the Medical Building.

FRIDAY, OCTOBER 14

*9-10 a. m. Boston Dispensary. The Nature, Criteria of Treatment and Prognosis of Multiple Sclerosis. Dr. T. J. Putnam.

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

SATURDAY, OCTOBER 15

*9-10 a. m. Boston Dispensary. Hospital case presentation. Dr. S. J. Thannhauser.

*10 a. m. - 12 m. Staff rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.

OCTOBER 7 and 8 — Conference on Rural Medicine. Page 180, issue of August 4, and page 407, issue of September 15.

OCTOBER 8 and NOVEMBER 15 — American Board of Ophthalmology. Page 282, issue of February 10.

OCTOBER 13 — Pentucket Association of Physicians, 8:30 p. m., Hotel Bartlett, 95 Main Street, Haverhill.

OCTOBER 17, 1938 and FEBRUARY 20, 1939 — American Board of Internal Medicine, Inc. Page 216, issue of August 11.

OCTOBER 17-21 — Clinical Congress of the American College of Surgeons, New York City.

OCTOBER 18 — South End Medical Club. Notice above.

OCTOBER 19 —New England Dermatological Society. Notice above.

OCTOBER 24-26 — Academy of Physical Medicine, Scientific Session. Washington, D. C.

OCTOBER 24 - NOVEMBER 4 — Graduate Fortnight of the New York Academy of Medicine. Page 181, issue of August 4.

OCTOBER 25-28 — American Public Health Association. Page 321, issue of September 1.

OCTOBER 31, NOVEMBER 1, 2, 3 and 4 — Inter-State Postgraduate Medical Association. Page 451, issue of September 22.

NOVEMBER 5 — American Board of Obstetrics and Gynecology. Page 145, issue of July 28.

NOVEMBER 5, 1938; FEBRUARY 4, MAY 15 and 16, 1939 — American Board of Obstetrics and Gynecology. Page 451, issue of September 22.

NOVEMBER 15-16 — New England Postgraduate Assembly. Page vii, Advertising Section, issue of September 29.

MARCH 27-31, 1939 — American College of Physicians. Page 36, issue of July 7.

MAY 7-15, 1939 — International Congress of Military Medicine and Pharmacy. Page 501, issue of September 29.

SEPTEMBER, 1939 — Boston Psychoanalytic Institute. Page 450, issue of September 22.

BOOKS RECEIVED FOR REVIEW

The 1938 Year Book of Physical Therapy. Edited by Richard Kovács. 486 pp. Chicago: Year Book Publishers, Inc., 1938. $2.50.

Endocrine Therapy in General Practice. Elmer L. Sevringhaus. 192 pp. Chicago: Year Book Publishers, Inc., 1938. $2.75.

Practical Microbiology and Public Health: For students of medicine, public health, and general bacteriology. William B. Sharp. 492 pp. St. Louis: C. V. Mosby Company, 1938. $4.50.

The Pneumonias. Hobart A. Reimann. 381 pp. Philadelphia and London: W. B. Saunders Company, 1938. $5.50.

Plastic Surgery. Arthur J. Barsky. 355 pp. Philadelphia and London: W. B. Saunders Company, 1938. $5.75.

Internal Medicine: Its theory and practice. Edited by John H. Musser. Third edition. 1428 pp. Philadelphia: Lea & Febiger, 1938. $10.00.

Diseases of the Chest and the Principles of Physical Diagnosis. George W. Norris and H. R. M. Landis. Sixth edition. 1019 pp. Philadelphia and London: W. B. Saunders Company, 1938. $10.00.

A Historical Chronology of Tuberculosis. Richard M. Burke. 84 pp. Springfield, Illinois, and Baltimore: Charles C Thomas, 1938. $1.50.

A Manual of Reparative Plastic Surgery. J. Eastman Sheehan. 311 pp. New York and London: Paul B. Hoeber, Inc., 1938. $5.50.

Biography of the Unborn. Margaret S. Gilbert. 132 pp. Baltimore: Williams & Wilkins Company, 1938. $1.75.

The Etiology of Trachoma. Louis A. Julianelle. 248 pp. New York: The Commonwealth Fund, 1938. $3.25.

BOOK REVIEWS

Pathological Technique: A practical manual for workers in pathological histology including directions for the performance of autopsies and for microphotography. Frank B. Mallory. 434 pp. Philadelphia and London: W. B. Saunders Co., 1938. $4.50.

Every pathologist and laboratory worker will welcome the appearance of this volume. Mallory and Wright's *Histologic Technique* was the standard through many editions and has been out of print and virtually impossible to obtain for years.

This new book by Dr. Mallory retains all the good features of the former, is reduced in size through the omission of extraneous and outdated material and adds much new information. It is divided into three parts: general materials and histologic methods; special histologic methods, covering cytology, special tissues and special organs; and autopsy methods. Useful chapters are included on preservation of gross specimens and photography, both gross and microscopic.

The fairly extended discussion of bacteriological methods included in the Mallory and Wright book has been partly omitted and the remainder condensed to two compact, useful chapters on bacterial stains and the demonstration of organisms, including the Rickettsiae and viruses, in tissues.

One of the most valuable features is the fact that all methods have been carefully checked as to procedure and the results to be expected are clearly stated in connection with each method. Thus those unfamiliar with a given method may learn exactly what the final outcome should be. Perhaps the greatest value of the book lies in the fact that the methods included are not merely an unselected collection of those which have been described in various places by one author or another. Instead this book is a compendium of the methods that have been found useful by the greatest master of pathological technic. There is an accurate bibliography.

Materia Medica: Drug administration and prescription writing. Oscar W. Bethea. Fifth revised edition. 577 pp. Philadelphia: F. A. Davis Co., 1938. $5.00.

The subjects presented in this volume are under three headings with an appendix.

The first part presents information relating to the sources, characteristics and uses of official and unofficial drugs with explanations of their therapeutic uses, incompatibilities and, in addition, some combinations which have been approved by certain recognized authorities.

Part two is devoted to prescription writing with illustrations of correct and faulty methods. Warnings and advice are given which, if followed, will be of assistance in promoting the co-operation between the doctor and the pharmacist when serving those who may require drugs. This part will be of assistance to medical students and practitioners who may have been inadequately trained in this field. The vicious custom of prescribing proprietary medicines is emphasized.

While it must not be assumed that this book will take the place of the *United States Pharmacopoeia* or the *National Formulary*, it is a valuable addition to the library of the younger members of the profession especially when one appreciates that many medical textbooks cannot be regarded as fully up to date at the time of publication because of the rapid changes which are constantly taking place as the result of the discovery of new therapeutic agents.

It is a useful and well-written publication, but will not eliminate the supplementary reading of current medical journals that is necessary in order to maintain a working acquaintance with the products of well-equipped research organizations and the scientific application of them.

Pre-Natal and Post-Natal Management. J. St. George Wilson. 206 pp. Baltimore: William Wood & Co., 1937. $4.00.

Though published in Baltimore, this manual emanates from Liverpool and is therefore of less value to American physicians than it doubtless will be to clinicians already acquainted with many of the methods and materials mentioned in the text. To suggest a "biscuit and dry rusk" for morning nausea is not enlightening here, nor can advice to insert a "stomach tube" into the uterus to induce abortion be taken seriously by a local physician who might also wonder what to do with the funnel and bulb. Innumerable instances of such differences in terminology, attitudes or methods (such as collapse of hydrocephalus by abdominal puncture and aspiration) might be mentioned, but to do so would give a wrong impression of the value of this little book.

It may be characterized as a more or less extensively annotated outline or index of prenatal and postnatal conditions, and of their causes and treatments. As such it is commendably comprehensive of subjects. The text is arranged in chapters, subchapters, main headings, subheadings, all in appropriate print, so that the subjects are easily located. The style is simple and direct. There are no references, no statistics, no footnotes. There are many illustrations, some of them helpful, some of them not. The paper, print, cloth and board binding are excellent. The reviewer believes this manual could be very helpful to a moderately well-trained clinician who is forced to practice obstetrics and who lacks and cannot acquire the assistance of more comprehensive American textbooks, and to the well-trained obstetrician whose practice is small and whose memory needs polishing, as well as to the inquisitive expert who is curious of foreign methods and attitudes. It cannot be unqualifiedly recommended to students in American medical schools.

Tuberculosis Clinic Manual: A report of the Committee on Clinic Standards of the National Tuberculosis Association. Herbert R. Edwards, Chairman. 57 pp. New York: National Tuberculosis Association, 1938.

This small pamphlet printed in brochure form is Number 12 in a technical series published by the National Tuberculosis Association.

With the growth of the tuberculosis clinics in general hospitals and especially in municipal and town health departments, a manual of this type on the general conduct and standards of such dispensaries is quite welcome. Not since 1916 has such a manual been published. It deals with the many newer developments and clinic functions, such as educational activities, case-finding methods and standards of tuberculosis services.

The chapter on the scope of medical services and clinic procedures includes pneumothorax therapy as an outpatient-clinic function — one of the more recent and important activities of such clinics. With the aggressive case-finding methods now used throughout the country, tuberculosis must become more and more of an outpatient problem as the demands for sanatorium beds become greater, and the

economic needs of ambulatory patients require that free treatment shall be given — preferably in the neighborhood where the patient resides.

Being a technical manual, it is naturally of most interest to physicians and nurses connected with tuberculosis-dispensary practice. Like all manuals it is necessarily incomplete and cannot meet all the problems that may present themselves in individual cases. Such standards of practice as are devised can at best be only suggestive and are bound to be altered by the varying circumstances met in an individual community. It contains, however, a large amount of technical material on the peculiar problems of tuberculosis-dispensary practice, and physicians and nurses connected with such dispensaries will find a great deal of practical information to guide them in their work.

Maternal Care Complications: The principles of management of some serious complications arising during the antepartum, intrapartum, and postpartum periods. R. D. Mussey; P. F. Williams and F. H. Falls. Edited by F. L. Adair. 95 pp. Chicago: The University of Chicago Press, 1938. $1.00.

This book is a supplementary volume to *Maternal Care* which was published by the American Committee on Maternal Welfare two years ago. It contains chapters on "Toxemias of Pregnancy," "Obstetric Hemorrhages" and "Puerperal Infection." It is a clear, concise statement of these three complications and their treatment.

There can be no doubt that if the advice given in this book were followed carefully throughout the country, the results for both the mother and the baby would be greatly improved. It is a perfectly safe and sound book to put into the hands of all practitioners of medicine.

British Periodicals of Medicine: A chronological list. W. R. Lefanu. 93 pp. Baltimore: The Johns Hopkins Press, 1938. $1.25.

Mr. Lefanu, librarian of the Royal College of Surgeons of England, has listed 1362 medical periodicals published in England and the British Empire from 1684 to 1938. The list, chronologically arranged, covers medicine, anthropology and pharmacy, but omits veterinary medicine. Originally published in the *Bulletin of the Institute of the History of Medicine*, the bibliography now appears in convenient book form, reasonably priced and excellently printed. There is a useful index. Medical librarians and others are greatly indebted to Mr. Lefanu for making his unique survey.

The Construction of Vulcanite Applicators for Applying Radium to Lesions of the Buccal Cavity, Lips, Orbit and Antrum. Desmond G. Walker, 61 pp. London: John Murray, 1938. 5/.

This brief, compact book is written in a style which is entirely clear but without literary elegance. In the short introduction the author states concisely the six essential points which he believes should be observed in the construction of vulcanite appliances for radium treatment. He leaves to the expert radiotherapist the problem of the exact dosage of radium. He does, however, discuss briefly the various units which are used. The third and principal chapter concerns itself with the technic of constructing applicators, the methods of obtaining impressions and the means of fixation. This part of the book is profusely illustrated with photographs. A valuable bibliography is appended.

Triumph Over Pain. René Fülöp-Miller. 438 pp. Indianapolis and New York: The Bobbs-Merrill Co., 1938. $3.50.

The subject of pain and the history of the remedies used to overcome it are described in Fülöp-Miller's book in a manner worthy of the topic. A thorough study of pain from the earliest days to the present, complete with bibliographical references and numerous illustrations and, moreover, written in an engaging literary style, makes this book an outstanding contribution to the history of medicine. The material is well evaluated, particularly the "ether controversy," and much new data has been added by this Hungarian scholar. The book can be highly recommended.

Index Médico-Pharmaceutique. N. T. Deleanu, René Febre and L. Coniver. 756 pp. Paris: Masson et Cie, 1937. 120 Fr. fr.

This volume is largely a list of drugs in tabular form showing dosage, symptoms of intoxication, antidotes, incompatibilities and indications.

There are five short introductory chapters. They treat of poisoning, the theory of the general action of drugs, the relation of chemical constitution to physiologic action and galenic pharmacy.

This volume might be a useful reference work in a medical library but is not of importance for the private library of the physician.

William Alanson White: The autobiography of a purpose. William A. White. 293 pp. New York: Doubleday, Doran & Co., Inc., 1938. $3.00.

The chief points of interest in this autobiography are those relating to Saint Elizabeths Hospital, a government institution for the insane. Dr. White was superintendent for over thirty years. There are many details which will be of value to hospital administrators. On the whole the book is dull and heavy. It will interest a few.

Leaves from a Surgeon's Case-Book. James Harpole. 300 pp. New York: Frederick A. Stokes Co., 1938. $2.75.

Dr. Harpole, an English surgeon, who served in the World War, writes an interesting story of his cases and related topics, under a pseudonym. He obviously draws from his own casebook and relates many incidences from a large practice in a vivid and entertaining manner. He later takes up the story of the great discoveries in medicine in the last three decades, exhibiting a wide knowledge of English medical history. Although written in a popular style, the author refrains from the journalese, which mars so many books of a similar character. Simple in style, the book should make a wide appeal to both physicians and the public.

Clinical Roentgenology of the Digestive Tract. Maurice Feldman. 1014 pp. Baltimore: William Wood & Co., 1938. $10.00.

It is difficult not to be too laudatory of this book, which is well balanced throughout, well written and splendidly illustrated and has a comprehensive bibliography. Every roentgenologist should own it. Indeed it would seem to be a necessity for any internist. It does not unduly stress the advantages of roentgenological studies but candidly states their limitations as well. It is well documented with statistics from the medical literature as well as from the author's broad personal experience.